STIC Search Report
EIC 2600

STIC Database Tracking Number: 180375

TO: Scott Beliveau
Location: Knox 6A01
Art Unit: 2614
Tuesday, February 28, 2006

Case Serial Number: 09/668465

From: Pamela Reynolds
Location: EIC 2600
KNOX 8B54
Phone: 571-272-3505

Pamela.Reynolds@uspto.gov

Search Notes

Dear Scott Beliveau,

Please find attached the search results for 09668465. I used the search strategy we discussed. I searched the standard Dialog files, IEEE,, Proquest, and the internet.

If you would like a re-focus please let me know.

Thank you.

RUSH SPE SIGNATURE _____ (12) Access DB# 180375

Pam next week (by Tues.)

SEARCH REQUEST FORM

Scientific and Technical Information Center

EIC 2600

Requester's Full Name Scott Beliveau Examiner # 79346 Date 2/23/06
Art Unit 2614 Phone Number 27343 Serial Number 09/668465
Office Location KNX6A01 Format preferred (circle) PAPER EMAIL BOTH

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Let us know what you already have and so do not need. Include the keywords, synonyms and meaning of acronyms. Define all terms that may have a specific meaning. Please attach a copy of the background, abstract, claims and other pertinent information.
Please state how the terms or keyword strings should relate to one another.

Title of the Invention Television Program Recommendation system
Inventor(s)
Mikhail Prokopenko et al.

Earliest Priority date to be used 9/30/1999

Looking for TV program recommender which uses cluster analysis techniques in order to recommend TV shows. In particular, it records program characteristics and user characteristics (ex. comedy - Happy mood) when a program is originally watched. It then forms sets of attributes common to multiple programs watched and compares these sets to available programming choices for a ~~match~~ (cover) match

Attributes

Figure 3

****

STAFF USE ONLY

Searcher Pamela Reynolds
Phone 23905
Location Knox 8B59
Date picked up 2-27-06 11:00
Date completed 2-28-06 10:30
Search Prep/review _____
Online Time _____

TYPE of Search
Text ✓
Litigation ____
Other ____

Databases Searched
Dialog ✓
STN ____
QuestelOrbit ____
LEXIS/NEXIS ____
Courtlink ____
Other ✓

User watches 3 programs P_1 + P_2 + P_3 with attributes A_1 A_2 A_3 A_4

Comedy Actor User mood (happy, sad)

$P_1 = \{ A_1\ A_2\ A_3 \}$

$P_2 = \{ A_1\ A_2\ A_4 \}$

$P_3 = \{ A_1\ A_3 \}$

> 1 program > 1 match attributes

happy = comedy

happy = horror

System forms sets based on common attributes

$S_1 = \{ A_1 + A_3 \}$

Comedy Happy

System compares with Available programs for Recommendation

$P_4 = \{ A_1 + A_3 \}$ ← And Recomends the match

$P_5 = \{ A_1 + A_4 \}$

available programs coming in

minimum 2 person / program

match attributes

to recommend

within viewing session

Customer profiling Not Counts

→ watch the it you

→ watching programs & at least

→ use it to recommend upcoming / future current

IN THE CLAIMS:

Please amend Claims 1, 9 and 17 as follows. Please cancel Claims 8, 16 and 24 without prejudice or disclaimer of subject matter. The claims, as pending in the subject application, read as follows:

1. (Currently Amended) A method of enabling a selection of a program for viewing in a television system, the method comprising the steps of:

recording attributes associated with each program selected by a user in the television system, said attributes comprising first attributes associated with characteristics of said programs and second attributes associated with the user at a time the programs are selected, wherein said first attributes are made available as Electronic Program Guide (EPG) data;

forming sets of said attributes in response to said user selecting at least two of said programs having shared attributes, wherein each of said sets comprise comprises at least two of said attributes; and

upon entry of a user request for a program recommendation, performing a search for programs with attributes that include all the attributes of at least one of said sets, and notifying said user of an availability of programs that include all the attributes of at least one of said sets as program recommendations.

2. (Cancelled)

File 9:Business & Industry(R) Jul/1994-2006/Feb 27
(c) 2006 The Gale Group
File 15:ABI/Inform(R) 1971-2006/Feb 27
(c) 2006 ProQuest Info&Learning
File 16:Gale Group PROMT(R) 1990-2006/Feb 28
(c) 2006 The Gale Group
File 20:Dialog Global Reporter 1997-2006/Feb 28
(c) 2006 Dialog
File 47:Gale Group Magazine DB(TM) 1959-2006/Feb 27
(c) 2006 The Gale group
File 75:TGG Management Contents(R) 86-2006/Feb W3
(c) 2006 The Gale Group
File 80:TGG Aerospace/Def.Mkts(R) 1982-2006/Feb 27
(c) 2006 The Gale Group
File 88:Gale Group Business A.R.T.S. 1976-2006/Feb 21
(c) 2006 The Gale Group
File 98:General Sci Abs 1984-2004/Dec
(c) 2005 The HW Wilson Co.
File 112:UBM Industry News 1998-2004/Jan 27
(c) 2004 United Business Media
File 141:Readers Guide 1983-2004/Dec
(c) 2005 The HW Wilson Co
File 148:Gale Group Trade & Industry DB 1976-2006/Feb 27
(c)2006 The Gale Group
File 160:Gale Group PROMT(R) 1972-1989
(c) 1999 The Gale Group
File 275:Gale Group Computer DB(TM) 1983-2006/Feb 27
(c) 2006 The Gale Group
File 264:DIALOG Defense Newsletters 1989-2006/Feb 27
(c) 2006 Dialog
File 484:Periodical Abs Plustext 1986-2006/Feb W3
(c) 2006 ProQuest
File 553:Wilson Bus. Abs. 1982-2004/Dec
(c) 2005 The HW Wilson Co
File 570:Gale Group MARS(R) 1984-2006/Feb 27
(c) 2006 The Gale Group
File 608:KR/T Bus.News. 1992-2006/Feb 28
(c)2006 Knight Ridder/Tribune Bus News
File 620:EIU:Viewswire 2005/Oct 19
(c) 2005 Economist Intelligence Unit
File 613:PR Newswire 1999-2006/Feb 28
(c) 2006 PR Newswire Association Inc
File 621:Gale Group New Prod.Annou.(R) 1985-2006/Feb 27
(c) 2006 The Gale Group
File 623:Business Week 1985-2006/Feb 27
(c) 2006 The McGraw-Hill Companies Inc
File 624:McGraw-Hill Publications 1985-2006/Feb 27
(c) 2006 McGraw-Hill Co. Inc
File 634:San Jose Mercury Jun 1985-2006/Feb 26
(c) 2006 San Jose Mercury News
File 635:Business Dateline(R) 1985-2006/Feb 27
(c) 2006 ProQuest Info&Learning
File 636:Gale Group Newsletter DB(TM) 1987-2006/Feb 27
(c) 2006 The Gale Group
File 647:CMP Computer Fulltext 1988-2006/Mar W1
(c) 2006 CMP Media, LLC
File 696:DIALOG Telecom. Newsletters 1995-2006/Feb 27
(c) 2006 Dialog
File 674:Computer News Fulltext 1989-2005/Oct W2
(c) 2005 IDG Communications
File 810:Business Wire 1986-1999/Feb 28

(c) 1999 Business Wire
File 813:PR Newswire 1987-1999/Apr 30
(c) 1999 PR Newswire Association Inc
File 587:Jane`s Defense&Aerospace 2006/Feb W3
(c) 2006 Jane`s Information Group

Set	Items	Description
S1	863360	(TELEVISION OR TV)(3N)(PROGRAM? OR GUIDE? OR NAVIGATION?)
S2	42082	EPG OR ELECTRONIC(3N)(GUIDE? OR SELECTIONS OR MENUS)
S3	49587	CLUSTER?(3N)(ANALYSIS? OR ANALY?ING OR EVALUAT? OR ALGORITHM? OR STATISTIC? OR SYSTEM?)
S4	432148	(SHOWS OR PROGRAMS OR MOVIES OR FILMS)(3N)(SUGGEST? OR RECOMMEND? OR PROVID? OR MATCH? OR SIMILAR? OR COMMON?)
S5	12621025	CHARACTERISTIC? OR FACTOR?? OR ATTRIBUT? OR DESCRIPTION?
S6	115319	(USER OR SUBSCRIBER? OR VIEWER?? OR PERSON OR CUSTOMER?)(3N)(MOOD OR EMOTION? OR FEELINGS OR STATE(3N)MIND OR HAPPY OR SAD OR MAD OR ANGRY OR ANXIOUS OR FEARFUL OR DRAMATIC OR RELAXING)
S7	172955	(SETS OR STATISTICAL(3N)ATTRIBUTE? OR CLUSTER? OR GROUPING? OR GROUP??)(5N)S5
S8	3492	(CUSTOMI? OR PERSONAL?)(3N)S4
S9	3230	AU=(ZHANG, D? OR WONG, W? OR PROKOPENKO, M? OR ISLAM, F? OR ZHANG D? OR WONG W? OR PROKOPENKO M? OR ISLAM F?)
S10	1288	AU=(KOWALCZYK, R? OR OLDFIELD, M? OR BUTLER, M? OR TRAYERS, P? OR KOWALCZYK R? OR OLDFIELD M? OR BUTLER M? OR TRAYERS P?)
S11	2361	S5(5N)S4
S12	4894	(CHOICE? OR AVAILABL? OR FUTURE(3N)SHOWING OR QUEUE?)(5N)S4
S13	0	S11(S)S6
S14	2	S12(S)S6
S15	1	RD S14 (unique items)
S16	0	S15 NOT FOODS
S17	0	(S9 OR S10)(S)(S3 OR S7)
S18	4	(S9 OR S10) AND (S1 OR S2)
S19	3	RD S18 (unique items)
S20	3	S19 NOT S14
S21	3	RD S20 (unique items)
S22	0	(S1 OR S2)(S)(S3 OR S7)(S)S6
S23	225	(S1 OR S2)(S)(S3 OR S7)
S24	11	S23(S)(MOOD OR EMOTION? OR FEELINGS OR STATE(3N)MIND OR HAPPY OR SAD OR MAD OR ANGRY OR ANXIOUS OR FEARFUL OR DRAMATIC OR RELAXING)
S25	3	S24 NOT PY=>2000
S26	3	RD S25 (unique items)
S27	3	S26 NOT (S19 OR S14)
S28	225	S23(S)(S3 OR S7)
S29	10	S28(S)S4
S30	10	S29 NOT (S26 OR S19 OR S14)
S31	5	RD S30 (unique items)
S32	128	S4(S)S6
S33	6	S32(S)(S1 OR S2)
S34	6	S33 NOT (S29 OR S26 OR S19 OR S14)
S35	5	RD S34 (unique items)

21/3,K/1 (Item 1 from file: 88)
DIALOG(R)File 88:Gale Group Business A.R.T.S.

04074917 SUPPLIER NUMBER: 18827054
Pieces of a dream. (selected editorials dealing with racial issues)
Brewer, Caroline; Wilkins, Roger; Del Omo, Frank; Woo, William; Yellow Bird, Doreen; **Butler, Mary Ellen** ; Tucker, Cynthia; Garcia, Arnold Jr.; Trahant, Mark; Cose, Ellis; Farley-Villalobos, Robbie; **Wong, William**
The Masthead, v48, n3, p58(10)
Fall, 1996
ISSN: 0025-5122 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 6461 LINE COUNT: 00493

... **Butler, Mary Ellen** ...

... **Wong, William**
... of the El Paso Association of Hispanic Journalists. She is co-host of a monthly **TV program** titled "Border Journalists," and also hosts a radio program titled "State of the Arts," which...

21/3,K/2 (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

15441203 SUPPLIER NUMBER: 95681467 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Free space. (tech toys).
Lynch, Joan; **Butler, Maura** ; Miller, Matt
EDN, 47, 27, 81(1)
Dec 12, 2002
ISSN: 0012-7515 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 107 LINE COUNT: 00011

... **Butler, Maura**

TEXT:
...disk. Best of all, unlike PVRs such as TiVo, there's no fee for the **EPG** (**electronic** -program- **guide**) service. RCA/Thomson,

21/3,K/3 (Item 1 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)

01888780 SUPPLIER NUMBER: 17990970 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Video for the masses. (Intel's ProShare Video System 200 videoconferencing system) (includes a related article summarizing the review) (Software Review) (Evaluation)
Wong, William
LAN Magazine, v11, n2, p137(4)
Feb, 1996
DOCUMENT TYPE: Evaluation ISSN: 1069-5621 LANGUAGE: English
RECORD TYPE: Fulltext; Abstract
WORD COUNT: 3904 LINE COUNT: 00303

Wong, William
... sized screen and surround-sound audio used on the bridge of the Enterprise in the **television program** Star Trek. In fact, because of the trade-offs in cost and performance over an...

27/3,K/1 (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

07674284 SUPPLIER NUMBER: 16429243 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Materials handbook.
Ceramic Industry, v144, n1, p57(80)
Jan, 1995
ISSN: 0009-0220 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
WORD COUNT: 121175 LINE COUNT: 10041

... are used in electronic and aerospace applications. Other diamond-finished ceramic components include seals, thread **guides** , drawing dies and gyro bearing races. Many of these parts have tolerances down to 0 ...

27/3,K/2 (Item 1 from file: 608)
DIALOG(R)File 608:KR/T Bus.News.

06666474 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Computers, Internet Face Close Scrutiny after School Shootings
Jonathan Sidener
Arizona Republic
May 24, 1999
DOCUMENT TYPE: NEWSPAPER RECORD TYPE: FULLTEXT LANGUAGE: ENGLISH
WORD COUNT: 1530

...TEXT: t make bombs.
In his paper, Danielsen maintains that academic problems and the wrong peer **group** are **factors** that put youth at risk for violence. But the biggest factor is the home environment...measures found similar results. In self-reports, violent-game subjects were more likely to report **feelings** of anger.
In another study, violent game subjects were able to read hostile words such...

...relatively shorter times."
Anderson said violent games add to the aggressive behavior prompted by violent **television programs** . He said there are no studies yet to see whether games have the same effect...

27/3,K/3 (Item 1 from file: 636)
DIALOG(R)File 636:Gale Group Newsletter DB(TM)

04134277 Supplier Number: 54267468 (USE FORMAT 7 FOR FULLTEXT)
VIDEO NOTES.
Video Week, v20, n13, pNA
March 29, 1999
Language: English Record Type: Fulltext
Document Type: Newsletter; Trade
Word Count: 1262

(USE FORMAT 7 FOR FULLTEXT)
TEXT:
...weeks ago. Clients include CBS/Fox Video, Fox Lorber, Columbia House Video Library. All are " **happy** " with change, he said. Founded in 1986,

L.A.-based BGH now has 35 employees...

...at box office. Post-street date ad campaign will include ads in People, Entertainment Weekly, **TV Guide** , Playboy, ESPN magazine. Meanwhile, PHV is promoting March 30 direct-to- sellthrough release of The...

...Hard Rock Cafe, Warner Home Video, Continental Airlines, Healthy Choice Popcorn, Princess Cruises, Visa, Max **Factor** , Warner Music **Group** . Streaming video and sound clips to promote movies, videogames and music sold online are available...
?

31/3,K/1 (Item 1 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

10083159 Supplier Number: 86436226 (USE FORMAT 7 FOR FULLTEXT)
Identifying viewer segments for television programs.
Kim, Choong-Ryuhn
Journal of Advertising Research, v42, n1, p51(16)
Jan, 2002
Language: English Record Type: Fulltext
Document Type: Magazine/Journal; Refereed; Trade
Word Count: 7860

... 87), Weekend Dramas (.93), Movies (.94), Sports (.93), and Variety Shows (1.00) and information- **providing programs** such as News (1.00), Documentaries (.92), Current Specials (.99), Music/ Culture/Arts (1.00...

...also shows the proportion of each segment viewers who include program alternatives in their viewing **sets** .
Characteristics of viewer segments. Television viewing is a behavior that past research has shown to have...

31/3,K/2 (Item 1 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

42743783 (USE FORMAT 7 OR 9 FOR FULLTEXT)
MeeVee Unveils Video Search and Recommendation Engine Boasting Unmatched Intelligence and Personalization
PR NEWSWIRE (US)
June 06, 2005
JOURNAL CODE: WPRU LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 685

(USE FORMAT 7 OR 9 FOR FULLTEXT)

... and customizable experience with icons and colors used sparingly to maintain the best experience; * Personalized **Recommendations** -- Consumers rate **shows** as they use MeeVee and get personalized **recommendations** for other **programs** they may like based on those recommendations; and * Personal Planner -- Once consumers find a favorite ...

... and even emails the Planner to them on a weekly basis to create a personal **TV guide** . How it Works
MeeVee personalizes the TV search and discovery experience with three primary technologies...

31/3,K/3 (Item 1 from file: 484)
DIALOG(R)File 484:Periodical Abs Plustext

04178873 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Age identification, social identity gratifications, and television viewing
Harwood, Jake
Journal of Broadcasting & Electronic Media (GBEM), v43 n1, p123-136, p.14
Winter 1999
ISSN: 0883-8151 JOURNAL CODE: GBEM

DOCUMENT TYPE: Feature
LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 6330

TEXT:
... Watch Regularly). Factor analysis of show preference data failed to yield a usable solution. However, **cluster analysis** clearly indicated four **clusters** of shows. The first consisted of 24 shows including situation comedies (Fired Up, Naked Truth...

...for shows featuring younger people, participants were exposed to a number of short descriptions of **shows similar** to the descriptions found in **TV Guide** . In a set of 20 such descriptions, 12 were manipulated so as to feature either...

31/3,K/4 (Item 1 from file: 613)
DIALOG(R)File 613:PR Newswire

0001694221 I864D9F20D69711D9895AEF0ACD270B5D (USE FORMAT 7 FOR FULLTEXT)
MeeVee Unveils Video Search and Recommendation Engine Boasting Unmatched Intelligence and Personalization MeeVee Empowers Consumers With Smarter, Easier Way to Navigate the Rapidly Expanding Channel Universe
PR Newswire
Monday, June 6, 2005 T12:30:00Z
JOURNAL CODE: PR LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
DOCUMENT TYPE: NEWSWIRE
WORD COUNT: 689

...want to see."

The MeeVee.com Service MeeVee provides a full-featured service to navigate **TV programming** : * Sophisticated Search -- Consumers can find relevant results for searches on show titles, keywords, cast members, or other show **characteristics** . Items are also **grouped** to help viewing and advanced options provide even more power to filter searches; * Powerful and...

...and customizable experience with icons and colors used sparingly to maintain the best experience; * Personalized **Recommendations** -- Consumers rate **shows** as they use MeeVee and get personalized **recommendations** for other **programs** they may like based on those recommendations; and * Personal Planner -- Once consumers find a favorite...

...and even emails the Planner to them on a weekly basis to create a personal **TV guide** . How it Works

MeeVee personalizes the TV search and discovery experience with three primary technologies...

31/3,K/5 (Item 1 from file: 813)
DIALOG(R)File 813:PR Newswire

1148084 NYTH061
Jim Ramo Joins TVN Entertainment as President and Chief Operating Officer

DATE: September 4, 1997 09:30 EDT WORD COUNT: 806

...alongside companies and financial investors throughout the world.

TVN Entertainment Corporation is a leading satellite **television** pay-per- view **programming provider** , delivering hit **movies** to 840,000 direct-to-home (DTH) subscribers in a NVOD format, as well as...

... has developed and is now bringing to market a new "end-to-end" digital satellite **television programming** and delivery system, primarily targeted at the small to medium sized cable operators, as well as non- **clustered systems** of large MSO's, as the economically competitive answer to alternate digital entertainment delivery technologies...
?

35/3,K/1 (Item 1 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

38319183 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Alcatel to Showcase 'Video over Everything' Solutions at USTA's Telecom '04

PR NEWSWIRE (US)
October 11, 2004
JOURNAL CODE: WPRU LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 849

(USE FORMAT 7 OR 9 FOR FULLTEXT)

... differentiation over other video service providers and enables the flexibility to deliver video applications and **programs** that **provide** a unique service provider brand experience into subscribers' homes. -- Video Over Copper -- The Alcatel Advanced...

35/3,K/2 (Item 1 from file: 75)
DIALOG(R)File 75:TGG Management Contents(R)

00152748 SUPPLIER NUMBER: 12097244 (USE FORMAT 7 FOR FULL TEXT)
Feeling and liking responses to television programs: an examination of two explanations for media-context effects.
Murry, John P., Jr.; Lastovicka, John L.; Singh, Surendra N.
Journal of Consumer Research, v18, n4, p441(11)
March, 1992
ISSN: 0093-5301 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 7157 LINE COUNT: 00732

... evoke negative feelings that are normally considered unpleasant are frequently well liked.
The popularity of **programs** eliciting negative **feelings** **suggests** that **viewers** respond differently to the negative feelings evoked by dramatic **television** **programming** compated with negative feelings elicited by real-life events. If viewers of a news program...

...for themselves, then it follows that they would not enjoy the television-viewing experience. However, **viewers** of **dramatic** programs are aware that the program is simply "art" imitating life and not real life ...

35/3,K/3 (Item 1 from file: 88)
DIALOG(R)File 88:Gale Group Business A.R.T.S.

06695276 SUPPLIER NUMBER: 113645917
Development and features of a TV navigation system.(Author Abstract)
Isobe, Tadashi; Fujiwara, Masao; Kaneta, Hiroyuki; Uratani, Noriyoshi; Morita, Toshiya
IEEE Transactions on Consumer Electronics, 49, 4, 1035(8)
Nov, 2003
DOCUMENT TYPE: Author Abstract ISSN: 0098-3063 LANGUAGE: English
RECORD TYPE: Abstract

AUTHOR ABSTRACT: A **TV** **navigation** system has been developed to make it

easier for viewers to watch television in a multi-channel era. It enables viewers to watch **programs recommended** by the system as well as to select programs using a personalized **electronic** program **guide** (**EPG**) and retrieve programs with a personal filter. The system combines a mechanism for **recommending programs** in accordance with the preferences and **mood** of the **viewer** with personalized program sorting and retrieving in an easy-to-use format. Subjective evaluation tests were held to evaluate the impressions of general viewers with regard to operating this **TV navigation** system and benefiting from its use. It was found that program recommendations were helpful and...

35/3,K/4 (Item 1 from file: 484)
DIALOG(R)File 484:Periodical Abs Plustext

06912022 SUPPLIER NUMBER: 732807261 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Shooting People: Adventures in Reality TV
Vinson, Jacquelyn
Velvet Light Trap (VLLT), n54, p80-82, p.3
Fall 2004
JOURNAL CODE: VLLT
DOCUMENT TYPE: Book Review-Mixed
LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 1820

TEXT:
... in 1982 and which the authors categorize as "docusoap."
The term reality TV first found **common** usage with **shows** such as Cops, but Brenton and Cohen argue that the docusoap was its prototype. Unfortunately...

...in its thirteenth season, Real World has an important place in the history of reality **television programming** , yet, oddly enough, the authors gloss over it. Producers Mary Ellis Bunim andjon Murray both...

...aesthetic influenced the production of Real World, but the show is mainly interested in arousing **viewer emotion** and addressing their fantasies with titillating and salacious glimpses into the lives of real people...

...made its debut in 1992. Cops was another important event in the history of reality **television programming** because it was ridiculously cheap to produce by industry standards, it was very popular, and...

35/3,K/5 (Item 1 from file: 613)
DIALOG(R)File 613:PR Newswire

0001636163 I7F8E8DF01B9B11D9B0F0E436B27639B6 (USE FORMAT 7 FOR FULLTEXT)
Alcatel to Showcase 'Video over Everything' Solutions at USTA's Telecom '04 End-to-End Video Demonstration Focuses on the Many Ways Carriers Can Offer Revenue-Generating Video Services - Enabling the Final Piece of the 'Triple Play'
PR Newswire
Monday, October 11, 2004 T15:08:00Z
JOURNAL CODE: PR LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
DOCUMENT TYPE: NEWSWIRE
WORD COUNT: 853

...differentiation. These include services such as: broadcast TV; parental control and content search; high-performance **electronic guides** ; Video-on-Demand and personalized local content such as news, weather, events, and movie listings. It's all about sharing images and **emotions** , whatever the **user** 's device (TV, PC, laptop, PDA or mobile handset). -- Video Middleware -- The Open Media Platform...

...differentiation over other video service providers and enables the flexibility to deliver video applications and **programs** that **provide** a unique service provider brand experience into subscribers' homes. -- Video Over Copper -- The Alcatel Advanced...
?

```
File   2:INSPEC 1898-2006/Feb W3
         (c) 2006 Institution of Electrical Engineers
File   6:NTIS 1964-2006/Feb W1
         (c) 2006 NTIS, Intl Cpyrght All Rights Res
File   8:Ei Compendex(R) 1970-2006/Feb W3
         (c) 2006 Elsevier Eng.  Info. Inc.
File  34:SciSearch(R) Cited Ref Sci 1990-2006/Feb W3
         (c) 2006 Inst for Sci Info
File  35:Dissertation Abs Online 1861-2006/Feb
         (c) 2006 ProQuest Info&Learning
File  56:Computer and Information Systems Abstracts 1966-2006/Feb
         (c) 2006 CSA.
File  57:Electronics & Communications Abstracts 1966-2006/Feb
         (c) 2006 CSA.
File  65:Inside Conferences 1993-2006/Feb W4
         (c) 2006 BLDSC all rts. reserv.
File  94:JICST-EPlus 1985-2006/Dec W1
         (c)2006 Japan Science and Tech Corp(JST)
File  95:TEME-Technology & Management 1989-2006/Feb W4
         (c) 2006 FIZ TECHNIK
File  99:Wilson Appl. Sci & Tech Abs 1983-2006/Jan
         (c) 2006 The HW Wilson Co.
File 144:Pascal 1973-2006/Feb W1
         (c) 2006 INIST/CNRS
File 239:Mathsci 1940-2006/Apr
         (c) 2006 American Mathematical Society
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
         (c) 1998 Inst for Sci Info
File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13
         (c) 2002 The Gale Group
File 603:Newspaper Abstracts 1984-1988
         (c)2001 ProQuest Info&Learning
File 483:Newspaper Abs Daily 1986-2006/Feb 24
         (c) 2006 ProQuest Info&Learning
File 248:PIRA 1975-2006/Jan W5
         (c) 2006 Pira International

Set     Items   Description
S1     146651   (TELEVISION OR TV)(3N)(PROGRAM? OR GUIDE? OR NAVIGATION?)
S2       4778   EPG OR ELECTRONIC(3N)(GUIDE? OR SELECTIONS OR MENUS)
S3     118265   CLUSTER?(3N)(ANALYSIS? OR ANALY?ING OR EVALUAT? OR ALGORIT-
             HM? OR STATISTIC? OR SYSTEM?)
S4      84176   (SHOWS OR PROGRAMS OR MOVIES OR FILMS)(3N)(SUGGEST? OR REC-
             OMMEND? OR PROVID? OR MATCH? OR SIMILAR? OR COMMON?)
S5    9979782   CHARACTERISTIC? OR FACTOR?? OR ATTRIBUT? OR DESCRIPTION?
S6       7739   (USER OR SUBSCRIBER? OR VIEWER?? OR PERSON OR CUSTOMER?)(3-
             N)(MOOD OR EMOTION? OR FEELINGS OR STATE(3N)MIND OR HEALTH OR
             HAPPY OR SAD OR MAD OR ANGRY OR ANXIOUS OR FEARFUL OR DRAMATIC
              OR RELAXING)
S7    1173940   (SETS OR STATISTICAL(3N)ATTRIBUTE? OR CLUSTER? OR GROUPING?
              OR GROUP??) AND S5
S8        113   (CUSTOMI? OR PERSONAL?)(3N)S4
S9      30608   AU=(ZHANG, D? OR WONG, W? OR PROKOPENKO, M? OR ISLAM, F? OR
             ZHANG D? OR WONG W? OR PROKOPENKO M? OR ISLAM F?)
S10      5242   AU=(KOWALCZYK, R? OR OLDFIELD, M? OR BUTLER, M? OR TRAYERS,
             P? OR KOWALCZYK R? OR OLDFIELD M? OR BUTLER M? OR TRAYERS P?)
S11     18528   S5 AND S4
S12      5988   (CHOICE? OR AVAILABL? OR FUTURE(3N)SHOWING OR QUEUE?) AND -
             S4
S13        28   (S1 OR S2) AND S3
S14         1   S13 AND S6
```

```
S15          4   S4 AND S5 AND S6
S16          4   S15 NOT S13
S17          4   RD S16  (unique items)
S18         27   S13 NOT (S14 OR S15)
S19         22   S18 NOT PY=>2000
S20         19   RD S19  (unique items)
S21         14   S20 NOT (DISTANCE ()LEARNING OR DRUG OR DRUGS OR PSAS OR A-
                 LASKA OR CCD)
S22         44   (S9 OR S10) AND S4
S23         11   S22 AND S5
S24          3   S23 NOT PY=>2000
S25          3   RD S24  (unique items)
S26          0   S25 NOT (DRUG OR DRUGS OR CONFESSOR OR FERRITIN OR CDNA)
S27        352   S6 AND S7
S28          0   S27 AND (S8 OR S12)
S29          3   S27 AND (S1 OR S2)
S30          1   S29 NOT (S13 OR S14 OR S15)
S31          0   S30 NOT COMMERCIALS
S32          0   S12 AND S6
S33          0   S3 AND S4 AND S6
S34          4   S7 AND S8
S35          4   S34 NOT (S29 OR S13 OR S14 OR S15)
S36          2   S35 NOT PY=>2000
S37          2   RD S36  (unique items)
S38          0   S37 NOT (SPREAD()SHEET OR TRAINING)
S39         20   S3 AND S6
S40         19   S39 NOT (S34 OR S29 OR S13 OR S14 OR S15)
S41          9   S40 NOT PY=>2000
S42          9   RD S41  (unique items)
S43          1   S42 NOT (HEALTH OR MATURITY OR HEAD()INJURED OR MANUFACTUR-
                 ING OR HEALTH()CARE OR HEALTH()SERVICE? OR LEGAL OR VICTIM? OR
                  DYADIC)
```

14/3,K/1 (Item 1 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

772427 ORDER NO: AAD82-01220
TELEVISION PROGRAMMING **EVALUATION: A NEED-GRATIFICATION MODEL FOR AUDIENCE SEGMENTATION**
Author: DOMZAL, TERESA JANE
Degree: PH.D.
Year: 1981
Corporate Source/Institution: UNIVERSITY OF CINCINNATI (0045)
Source: VOLUME 42/10-A OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 4566. 354 PAGES

TELEVISION PROGRAMMING **EVALUATION: A NEED-GRATIFICATION MODEL FOR AUDIENCE SEGMENTATION**

...of widening the range of programming and information services available to the American consumer. Marketing **television programming** is not much different from marketing other products. It includes research, advertising, comprehensive and systematic planning. Understanding viewer preferences in **television programming** is essential for the successful marketing of cable and network programming directly to viewers.

Empirical...
...escape from problems, etc.). The basic premise of this study is that the choice of **television programming** varies according to the need gratification expected from watching television (i.e., reasons for viewing, enjoyment derived, etc.).

A study was conducted to determine viewers' choice patterns of **television programming** . A sample of 139 women was shown videotapes of 20 **television program** segments and asked to relate their perception, evaluation, categorization and choice of each show on scales provided in the questionnaire. A hierarchical **clustering algorithm** then was used to group respondents according to their choice of all 20 programs; it yielded three distinct groups (segments) of television viewers. The **analysis** of these **clusters** was based on a need satisfaction paradigm that identifies three types of needs associated with...

...Cluster 1 were identified as "television embracers," the segment that is the most accepting of **television** and its **programming** . In the need gratification context, embracers watch more "escapist" shows than the other segments and watch mainly to get away from their problems. This is an **emotional** orientation toward television.

Viewers in Cluster 3, identified as "television protesters," are the most selective in choosing programming, and...
...as education and income among clusters.

Grouping audience members according to their choice of 20 **television programs** has proved to be a useful approach to segmentation. This approach shows not only behavioral...

...more useful and enjoyable medium, and understanding audience needs more fully by direct assessment of **television programming** .

?

17/3,K/1 (Item 1 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

05040811 Genuine Article#: TK931 No. References: 44
Title: PSYCHOSOCIAL FACTORS **IN MATERNAL PHENYLKETONURIA - WOMENS ADHERENCE TO MEDICAL RECOMMENDATIONS**
Author(s): WAISBREN SE; HAMILTON BD; STJAMES PJ; SHILOH S; LEVY HL
Corporate Source: CHILDRENS HOSP,BIOCHEM GENET UNIT,IDA SMITH BLDG,300 LONGWOOD AVE/BOSTON//MA/02115; HARVARD UNIV,SCH MED,DEPT PSYCHIAT/BOSTON//MA/02115; HARVARD UNIV,SCH MED,DEPT NEUROL/BOSTON//MA/02115; UNIV MASSACHUSETTS,DEPT PSYCHOL/BOSTON//MA/02125; TEL AVIV UNIV,DEPT PSYCHOL/IL-69978 TEL AVIV//ISRAEL/
Journal: AMERICAN JOURNAL OF PUBLIC HEALTH, 1995, V85, N12 (DEC), P 1636-1641
ISSN: 0090-0036
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

Title: PSYCHOSOCIAL FACTORS **IN MATERNAL PHENYLKETONURIA - WOMENS ADHERENCE TO MEDICAL RECOMMENDATIONS**
Abstract: Objectives. This study identified **factors** predicting adherence to medical recommendations in maternal phenylketonuria which can result in severe fetal damage...
...pregnancy.

Conclusions. Women with phenylketonuria differed from their acquaintances and diabetic women in many respects, **suggesting** that special **programs** are needed. Greater emphasis on reproductive decision making is especially needed. Interventions that focus on...
Research Fronts: 94-0414 002 (PLANNED BEHAVIOR; PHYSICAL-ACTIVITY INTENTION; **USER** ATTITUDE; SUBJECTIVE NORM; **HEALTH** PSYCHOLOGY)
94-4339 001 (SELF-ESTEEM OF ADOLESCENTS; DEAF PEOPLE; SOCIAL COMPETENCE)
94-7371 001...

17/3,K/2 (Item 1 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01834462 ORDER NO: AADAA-I3013793
Two essays related to labor market behavior: Demand for publicly provided **job training** programs **in Illinois and poor health, asset accumulation, and early retirement behavior**
Author: Miah, Mohammad Solaiman
Degree: Ph.D.
Year: 2001
Corporate Source/Institution: Northern Illinois University (0162)
Source: VOLUME 62/05-A OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 1896. 118 PAGES
ISBN: 0-493-23496-9

Two essays related to labor market behavior: Demand for publicly provided **job training** programs **in Illinois and poor health, asset accumulation, and early retirement behavior**

...for public job training programs in Illinois. My first objective is to determine which personal **characteristics** influence support for an increase in spending on publicly **provided** job training **programs** for the

unemployed across various income groups in Illinois. In particular, I empirically test for...
...of chronic health conditions on asset accumulation and retirement. Compared to a healthy worker, a **person** with a chronic **health** condition throughout his or her working life may have had reduced labor force participation and...

17/3,K/3 (Item 2 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01778956 ORDER NO: AADAA-I9990479
Operation planning for an energy service company
Author: Ng, Kah-Hoe
Degree: Ph.D.
Year: 2000
Corporate Source/Institution: Iowa State University (0097)
Source: VOLUME 61/10-B OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 5481. 186 PAGES
ISBN: 0-599-97266-1

...provide customer energy services. Three aspects of an ESCO operational planning are emphasized, i.e., **relaxing customer** demand using load management programs, serving customer energy services using energy contracts purchased through a...

...and management.
The major contributions of this research include: (1) classifying and categorizing the **factors** influencing an ESCO operation at various operational levels; (2) developing various mathematical models to...

...load management programs; (3) showing why and how an ESCO may utilize load management **programs** to **provide** energy services to the customers; (4) developing mathematical models to show how an ESCO...

17/3,K/4 (Item 3 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

756809 ORDER NO: AAD81-22552
VIEWING HABITS AND PREFERENCES OF CENTRAL IOWA FARM OPERATORS FOR TELEVISED AGRICULTURAL INFORMATION PROGRAMS
Author: NOMEIR, SAID ABDEL-FATTAH MOHAMED
Degree: PH.D.
Year: 1981
Corporate Source/Institution: IOWA STATE UNIVERSITY (0097)
Source: VOLUME 42/04-A OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 1583. 121 PAGES

...televised agricultural information programs (TAIP). The objectives of the study focused on demographic and background **characteristics** of the farm operators; their viewership potential; size of the audience; farm **viewer** preferences; **feelings** about TV as a source of agricultural information; reasons for watching (or not watching) such...

...was that programs were televised at inconvenient times which affected their level of viewing such **programs** . They **suggested** weekday evening scheduling of farm programs, grain and livestock market information on the

21/3,K/1 (Item 1 from file: 2)
DIALOG(R)File 2:INSPEC

07131161 INSPEC Abstract Number: C1999-02-6160M-014
Title: Audio feature extraction and analysis for scene segmentation and classification
Author(s): Zhu Liu; Yao Wang; Tsuhan Chen
Author Affiliation: Polytech. Univ., Brooklyn, NY, USA
Journal: Journal of VLSI Signal Processing Systems for Signal, Image, and Video Technology vol.20, no.1-2 p.61-79
Publisher: Kluwer Academic Publishers,
Publication Date: Oct. 1998 Country of Publication: Netherlands
CODEN: JVSPED ISSN: 0922-5773
SICI: 0922-5773(199810)20:1/2L.61:AFEA;1-U
Material Identity Number: G259-1998-007
U.S. Copyright Clearance Center Code: 0922-5773/98/$9.50
Language: English
Subfile: C

...Abstract: video scene analysis. As an example, we consider the problem of discriminating five types of **TV programs** , namely commercials, basketball games, football games, news reports, and weather forecasts. A set of low...
... The linear separability of different classes under the proposed feature space is examined using a **clustering analysis** . The effective features are identified by evaluating the intracluster and intercluster scattering matrices of the...

...these features, a neural net classifier was successful in separating the above five types of **TV programs** . By evaluating the changes between the feature vectors of adjacent clips, we also can identify...
...Identifiers: **clustering analysis** ;

21/3,K/2 (Item 1 from file: 6)
DIALOG(R)File 6:NTIS

1167097 NTIS Accession Number: ED-249 947
Summary of the 'ThinkAbout' Cluster Evaluation : Collection Information
Carrozza, F. ; Jochums, B.
Agency for Instructional Television, Bloomington, IN.
Corp. Source Codes: 060289000
Apr 79 25p
Languages: English
Journal Announcement: GRAI8511
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA 22210.
NTIS Prices: Not available NTIS

Summary of the 'ThinkAbout' Cluster Evaluation : Collection Information
...the 3-program 'Collecting Information' cluster of ThinkAbout, a series of 60 15-minute instructional **television programs** for fifth and sixth graders designed to strengthen reasoning skills and to review and reinforce ...

21/3,K/3 (Item 2 from file: 6)
DIALOG(R)File 6:NTIS
(c) 2006 NTIS, Intl Cpyrght All Rights Res. All rts. reserv.

1167096 NTIS Accession Number: ED-249 946
'ThinkAbout' Cluster Evaluation : **Collecting Information**
Carrozza, F. ; Jochums, B.
Agency for Instructional Television, Bloomington, IN.
Corp. Source Codes: 060289000
Apr 79 305p
Languages: English
Journal Announcement: GRAI8511
Available from ERIC Document Reproduction Service (Computer Microfilm International Corporation), Arlington, VA 22210.
NTIS Prices: Not available NTIS

'ThinkAbout' Cluster Evaluation : **Collecting Information**
...the 3-program 'Collecting Information' cluster of ThinkAbout, a series of 60 15-minute instructional **television programs** for fifth and sixth graders designed to strengthen reasoning skills and review and reinforce language...

21/3,K/4 (Item 1 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)
(c) 2006 Elsevier Eng. Info. Inc. All rts. reserv.

07403691 E.I. No: EIP05209106202
Title: Audio feature extraction and analysis for scene segmentation and classification
Author: Liu, Zhu; Wang, Yao; Chen, Tsuhan
Corporate Source: Polytechnic University, Brooklyn, NY 11201, United States
Source: Journal of VLSI Signal Processing Systems for Signal, Image, and Video Technology v 20 n 1-2 1999. p 61-79
Publication Year: 1999
CODEN: JVSPED ISSN: 0922-5773
Language: English

...Abstract: video scene analysis. As an example, we consider the problem of discriminating five types of **TV programs** , namely commercials, basketball games, football games, news reports, and weather forecasts. A set of low...

...The linear separability of different classes under the proposed feature space is examined using a **clustering analysis** . The effective features are identified by evaluating the intracluster and intercluster scattering matrices of the...
...these features, a neural net classifier was successful in separating the above five types of **TV programs** . By evaluating the changes between the feature vectors of adjacent clips, we also can identify...

21/3,K/5 (Item 2 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)
(c) 2006 Elsevier Eng. Info. Inc. All rts. reserv.

04277115 E.I. No: EIP95112909271
Title: Model for the selection process of the design modification

guideline (application to packaging and assembly design of electronic systems)
Author: Kobayashi, Hideki; Nakajima, Naomasa
Source: Nippon Kikai Gakkai Ronbunshu, C Hen/Transactions of the Japan Society of Mechanical Engineers, Part C v 61 n 588 Aug 1995. p 3361-3368
Publication Year: 1995
CODEN: NKCHDB ISSN: 0387-5024
Language: Japanese

...Abstract: we made a prototype of a design modification guideline selection support system. To make a **system** , modification guidelines were **clustered** by multivariate **analysis** . We used a decision table consisting of clustered level knowledge for the prototype. The synthetic...
Identifiers: Skill; Process knowledge; Association; Multivariate analysis ; Unanticipated function; **Electronic** system; Design modification **guidelines**

21/3,K/6 (Item 3 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

01914395 E.I. Monthly No: EIM8512-080995
Title: Simulation and Evaluation of a Grid of Programs for the French National TV Channels.
Title: SIMULATION ET EVALUATION D'UNE GRILLE DE PROGRAMMES POUR LES CANAUX DE LA TELEVISION FRANCAISE.
Author: Roucairol, C.; Jacquet-Lagreze, E.; Bouroche, J. M.; Martinet, M.
Corporate Source: Univ Paris 6, Paris, Fr
Conference Title: Operational Research '84, Proceedings of the Tenth International Conference.
Conference Location: Washington, DC, USA Conference Date: 19840806
E.I. Conference No.: 07201
Source: Publ by North-Holland, Amsterdam, Neth and New York, NY, USA p 985-997
Publication Year: 1984
ISBN: 0-444-87561-1
Language: French

...Abstract: whole grid, depending on the data used and the population chosen (i. e. after a **cluster analysis**). In each case, it is possible to optimize a grid using quadratic assignment programming. The...
Identifiers: FRENCH NATIONAL **TELEVISION** SYSTEM; QUADRATIC ASSIGNMENT **PROGRAMMING**

21/3,K/7 (Item 1 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01194715 ORDER NO: AAD91-29621
A CANONICAL CORRELATION ANALYSIS OF THE USES AND GRATIFICATIONS ASSOCIATED WITH PATTERNS OF TELEVISION VIEWING BEHAVIOR
Author: ZELLE, CLAIRE CHRISTINE
Degree: PH.D.
Year: 1991
Corporate Source/Institution: UNIVERSITY OF NORTHERN COLORADO (0161)
Source: VOLUME 52/07-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
PAGE 3697. 211 PAGES

...communications research, there is no one to one correspondence between the reasons audience members watch **television** and the **program** choices which they make. The central objective of this study was to conduct a multivariate...

...canonical correlation analysis.
The study took the form of an informal three-way canonical correlation **analysis** by first **clustering** 2,476 subjects on a battery of 139 leisure interests and activities using Ward's...

21/3,K/8 (Item 2 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

01175824 ORDER NO: AAD91-24686
TELEVISION **AUDIENCE--** PROGRAM **CONTENT INTERACTION IN MEANING CONSTRUCTION: THE CUING PROCESS**
Author: REYNOLDS, NANCY JEAN
Degree: PH.D.
Year: 1991
Corporate Source/Institution: THE UNIVERSITY OF WISCONSIN - MADISON (0262)
Source: VOLUME 52/05-A OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 1558. 194 PAGES

TELEVISION **AUDIENCE--** PROGRAM **CONTENT INTERACTION IN MEANING CONSTRUCTION: THE CUING PROCESS**

...actual program content is skeletal.
To identify the cues and related knowledge in a fictional **television program** , 54 adults individually viewed a police drama, and they were asked to stop the program...

...but interesting differences between study conditions.
Five types of subjects were identified using non-hierarchical **cluster analysis** of their impressions of the detective. Types did differ in how responsive they were to...

21/3,K/9 (Item 3 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

743603 ORDER NO: AAD81-09438
NOVICE INTERVIEWERS' MESSAGE STRUCTURE AND INTERVIEW METHODS.
Author: HAGEN, SUZANNE JOHNSON
Degree: PH.D.
Year: 1980
Corporate Source/Institution: UNIVERSITY OF MINNESOTA (0130)
Source: VOLUME 41/11-A OF DISSERTATION ABSTRACTS INTERNATIONAL. PAGE 4540. 336 PAGES

...of Minnesota interviewing course. Each student interviewed a stranger, obtaining the respondent's opinion of **television programming** . The students audio-taped and transcribed the interview. These transcripts constituted the data for the...

...Frequency counts of category occurrence were the basic procedure for describing the interviews. Chi-square **analysis** and **cluster analysis**

were also used to answer the research questions.
As a control, t-tests were used...

...questions; and (8) probes, a rarely used message, seemed to elicit personal and emotional responses.
Cluster analysis revealed four interviewer methods, each distinguished by the messages interviewers most often used in the...

21/3,K/10 (Item 4 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

698517 ORDER NO: AAD80-26095
RELATING TELEVISION PREFERENCE VIEWING TO SHOPPING ORIENTATIONS AND LIFE STYLES: THE EXAMINATION OF PERCEPTUAL AND PREFERENCE DIMENSIONS OF TELEVISION PROGRAMMING
Author: LUMPKIN, JAMES ROBERT
Degree: PH.D.
Year: 1980
Corporate Source/Institution: UNIVERSITY OF ARKANSAS (0011)
Source: VOLUME 41/05-A OF DISSERTATION ABSTRACTS INTERNATIONAL.
PAGE 2207. 131 PAGES

...VIEWING TO SHOPPING ORIENTATIONS AND LIFE STYLES: THE EXAMINATION OF PERCEPTUAL AND PREFERENCE DIMENSIONS OF TELEVISION PROGRAMMING

...as these advertisements potentially reach many diverse market segments. However, if the audience of various **television programs** could be profiled with respect to such useful descriptors as life styles and shopping orientations...

...be more efficiently matched to the audience.
Toward this end, previous researchers have investigated whether **television programs** can be classified into program types based on a single attribute--the most salient feature the programs have in common. Consumer choices among **television programs** may, however, be based on a multiplicity of attributes requiring a multidimensional approach which would...

...objective of this study was to define the perceived dimensions for a set of ten **television programs** , explore the nature of the dimensions, and suggest which programs are perceived to be similar...

...second objective of the study was to identify segments of the population which have similar **television program** preferences and investigate how these preference groups differ with respect to life styles, shopping orientations...

...Research Panel using a self-administered questionnaire. The questionnaire contained two major sections--one obtaining **television programming** perceptions and preferences and another gathering life styles and shopping orientations. The demographics were chosen...

...shopping orientation constructs were identified.
Using Multidimensional Scaling (MDS) it was found that the ten **television programs** were perceived in three dimensions which were labeled masculine-feminine, humorous-serious, and realistic-unrealistic. The perceived **television program** types matched those a priorily hypothesized. MDS appears to be a viable technique to explore dimensions of

television programs which may not be obvious but are nevertheless important and to position the programs relative to these dimensions.
Using **cluster analysis** , the study provided evidence to support the notion that there are groups of consumers which...

...previous research findings as the preference groups generally portrayed a preference for a set of **television programs** rather than a single program type dominating the preference group.
Unsing Multivariate Analysis of Variance...

...programs rather than on all of one type. Further research with a broader range of **television programs** is suggested in order to produce more distinctive preference groups.
...

21/3,K/11 (Item 1 from file: 94)
DIALOG(R)File 94:JICST-EPlus

04671705 JICST ACCESSION NUMBER: 00A0759175 FILE SEGMENT: JICST-E
The Classification of Samples Based on Similarity of Vocabulary Usage.
YAMAZAKI MAKOTO (1)
(1) National Japanese Language Res. Inst.
Kokuritsu Kokugo Kenkyujo Hokoku, 1999, NO.115, PAGE.26-75, FIG.17, TBL.10
JOURNAL NUMBER: S0650AAF
UNIVERSAL DECIMAL CLASSIFICATION: 002.5:025
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Original paper
MEDIA TYPE: Printed Publication

ABSTRACT: In this classify **television programs** were classified based on the similarity of vocabulary appearing in them based on Miyazima's...

...between samples. 2. No significant classification was obtained with quantification theory IV. 3. With a **cluster analysis** four or five groups were obtained. The principal factor governing this clustering was the use...
...DESCRIPTORS: **cluster analysis** ;

21/3,K/12 (Item 2 from file: 94)
DIALOG(R)File 94:JICST-EPlus

04410091 JICST ACCESSION NUMBER: 99A1030174 FILE SEGMENT: JICST-E
Presentation method of the caption in TV programs **and its effects.**
OKAMOTO TAKUYA (1); OKAWA YOSUKE (2); KUROSU MASAAKI (2)
(1) Shizuoka Univ., Grad. Sch.; (2) Shizuoka Univ., Fac. of Information
Hyumanv Intafesuv Shinpojiumu Ronbunshu(Human Interface), 1999, VOL.1999, PAGE.653-658, FIG.6, TBL.3, REF.3
JOURNAL NUMBER: Z0307BAK ISSN NO: 1345-0794
UNIVERSAL DECIMAL CLASSIFICATION: 621.397+654.197 681.51:007.51 159.938+159.929+159.9.01
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Conference Proceeding
ARTICLE TYPE: Original paper
MEDIA TYPE: Printed Publication

Presentation method of the caption in TV programs **and its effects.**
ABSTRACT: Now, various captions are used in various **television programs** . However, it is the present condition that there is no definition clearly carried out about...
...DESCRIPTORS: **cluster analysis ;**

21/3,K/13 (Item 3 from file: 94)
DIALOG(R)File 94:JICST-EPlus

03078704 JICST ACCESSION NUMBER: 96A0572552 FILE SEGMENT: JICST-E
TV **Popular** programs **and age group. Part 2. From the audience rating survey in the Kanto district, conducted by NHK.**
IIZUKA HISAKO (1)
(1) NHK
Nippon SAS Yuzakai Ronbunshu, 1996, NO.'96 SUGI-J, PAGE.59-68, FIG.4, TBL.3
JOURNAL NUMBER: Y0632AAP
UNIVERSAL DECIMAL CLASSIFICATION: 658.8 681.3:519.6
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Original paper
MEDIA TYPE: Printed Publication

TV **Popular** programs **and age group. Part 2. From the audience rating survey in the Kanto district, conducted...**
...ABSTRACT: rating survey for indivisuals over 7 years old. In this paper, the relation between popular **TV programs** and age group is anlayzed using the age data which is included in the survey...

...classified by sex and six age groups. Then it is compared yearly to carry out **cluster analysis** for the changing process and the characteristics of popular programs. As the result, the following...
...DESCRIPTORS: **cluster analysis ;**

21/3,K/14 (Item 4 from file: 94)
DIALOG(R)File 94:JICST-EPlus

02207817 JICST ACCESSION NUMBER: 94A0709540 FILE SEGMENT: JICST-E
Cluster Analysis **of** TV **Popular** Programs . **From the audience rating survey in the Kanto district, conducted by NHK.**
IIZUKA HISAKO (1)
(1) Jpn. Broadcast. Corp.
Nippon SAS Yuzakai Ronbunshu, 1994, NO.'94 SUGI-J, PAGE.477-482, TBL.5
JOURNAL NUMBER: Y0632AAP
UNIVERSAL DECIMAL CLASSIFICATION: 658.8.012+659
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Commentary
MEDIA TYPE: Printed Publication

Cluster Analysis **of** TV **Popular** Programs . **From the audience rating survey in the Kanto district, conducted by NHK.**
...DESCRIPTORS: **cluster analysis ;**
?

43/3,K/1 (Item 1 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online

0956938 ORDER NO: AAD87-13772
USING PERSONAL COMPUTERS AT HOME: RELATING TO THE COMPUTER, PERCEIVED CONTROL, AND TYPES OF USERS
Author: LERER, NAVA
Degree: PH.D.
Year: 1987
Corporate Source/Institution: CITY UNIVERSITY OF NEW YORK (0046)
Source: VOLUME 48/03-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
PAGE 918. 232 PAGES

...partner, thinker, friend, similar to people), "limited" (limited, useless, unpredictable) and servant (only one item). **Cluster analysis** of computer-related behaviors and self rating of expertise produced five meaningful user types: "very...

...mostly for word-processing.
Issues of interpersonal control were not found to be related to **feelings** , images, or **user** types. Personal efficacy was generally related to positive relations to the computer. While all users...
?

```
File 344:Chinese Patents Abs Jan 1985-2006/Jan
         (c) 2006 European Patent Office
File 347:JAPIO Nov 1976-2005/Oct(Updated 060203)
         (c) 2006 JPO & JAPIO
File 350:Derwent WPIX 1963-2006/UD,UM &UP=200614
         (c) 2006  Thomson Derwent

Set     Items   Description
S1      11250   (TELEVISION OR TV)(3N)(PROGRAM? OR GUIDE? OR NAVIGATION?)
S2       3694   EPG OR ELECTRONIC(3N)(GUIDE? OR SELECTIONS OR MENUS)
S3       2449   CLUSTER?(3N)(ANALYSIS? OR ANALY?ING OR EVALUAT? OR ALGORIT-
             HM? OR STATISTIC? OR SYSTEM?)
S4      13343   (SHOWS OR PROGRAMS OR MOVIES OR FILMS)(3N)(SUGGEST? OR REC-
             OMMEND? OR PROVID? OR MATCH? OR SIMILAR? OR COMMON?)
S5    5303590   CHARACTERISTIC? OR FACTOR?? OR ATTRIBUT? OR DESCRIPTION?
S6       2765   (USER OR SUBSCRIBER? OR VIEWER?? OR PERSON OR CUSTOMER?)(3-
             N)(MOOD OR EMOTION? OR FEELINGS OR STATE(3N)MIND OR HEALTH OR
             HAPPY OR SAD OR MAD OR ANGRY OR ANXIOUS OR FEARFUL OR DRAMATIC
              OR RELAXING)
S7     395787   (SETS OR STATISTICAL(3N)ATTRIBUTE? OR CLUSTER? OR GROUPING?
              OR GROUP??) AND S5
S8         28   (CUSTOMI? OR PERSONAL?)(3N)S4
S9       2144   AU=(ZHANG, D? OR WONG, W? OR PROKOPENKO, M? OR ISLAM, F? OR
              ZHANG D? OR WONG W? OR PROKOPENKO M? OR ISLAM F?)
S10       243   AU=(KOWALCZYK, R? OR OLDFIELD, M? OR BUTLER, M? OR TRAYERS,
              P? OR KOWALCZYK R? OR OLDFIELD M? OR BUTLER M? OR TRAYERS P?)
S11      5556   S5 AND S4
S12       263   (CHOICE? OR AVAILABL? OR FUTURE(3N)SHOWING OR QUEUE?) AND -
             S4
S13         2   S8 AND S6
S14         0   (S9 OR S10) AND S6
S15         1   (S9 OR S10) AND S4
S16         1   S15 NOT S13
S17       633   S7 AND S4
S18        18   S17 AND (S1 OR S2)
S19        17   S18 NOT (S13 OR S15)
S20         1   S19 NOT AD=19990930:20060228/PR
S21         2   S12 AND S6
S22         2   S21 NOT (S13 OR S15 OR S20)
S23         0   S22 NOT AD=19990930:20060228/PR
S24         0   S17 AND S6
S25        83   (S3 OR S7) AND S6
S26         1   S25 AND IC=H04N?
S27         1   S26 NOT (S18 OR S13 OR S15)
S28       595   (S1 OR S2) AND (S3 OR S7)
S29       393   S28 AND IC=H04N?
S30         0   S29 AND S6
S31         5   S28 AND S12
S32         0   S31 NOT (S26 OR S18 OR S13 OR S15)
```

16/3,K/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014294127 **Image available**
WPI Acc No: 2002-114830/200216
XRPX Acc No: N02-085615

Selection of a program for viewing in TV system that provides electronic program guide data by forming sets of characteristics and associating each set with ordered value representative of user's desire to view particular program

Patent Assignee: CANON KK (CANO)
Inventor: **BUTLER M ; ISLAM F F ; KOWALCZYK R ; OLDFIELD M A ;** PROPOPENKO M; **TRAYERS P ; WONG W Y ; ZHANG D M**
Number of Countries: 002 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
AU 200061287	A	20010405	AU 200061287	A	20000925	200216 B
JP 2001189896	A	20010710	JP 2000299286	A	20000929	200216
AU 748480	B	20020606	AU 200061287	A	20000925	200249

Priority Applications (No Type Date): AU 20008529 A 20000703; AU 993217 A 19990930
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
AU 200061287	A		83	H04N-005/00	
JP 2001189896	A		130	H04N-005/445	
AU 748480	B			H04N-005/00	Previous Publ. patent AU 200061287

Inventor: **BUTLER M ...**

... **ISLAM F F ...**

... **KOWALCZYK R ...**

... **OLDFIELD M A ...**

... **TRAYERS P ...** my application

... **WONG W Y ...**

... **ZHANG D M**

Abstract (Basic):
... with characteristics that best match the sets and notifying the user of an availability of **programs** that best **match** the sets as program recommendations.
?

20/3,K/1 **(Item 1 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

015860961 **Image available**
WPI Acc No: 2004-018791/200402
Related WPI Acc No: 1998-156667
XRPX Acc No: N04-014786

Information display for displaying electronic **program** guide , **displays program table that provides information of program designated by user, according to setup display conditions**

Patent Assignee: MATSUSHITA DENKI SANGYO KK (MATU)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 2003348477	A	20031205	JP 96183075	A	19960712	200402	B
			JP 2003190528	A	19960712		

Priority Applications (No Type Date): JP 96183075 A 19960712; JP 2003190528 A 19960712
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 2003348477	A		11	H04N-005/445	Div ex application JP 96183075

Information display for displaying electronic **program** guide , **displays program table that provides information of program designated by user, according to set**up display...

Abstract (Basic):
... program table comprising cells having predetermined length for storing preset program information. A display controller **sets** up display conditions for displaying program contents stored in a storage unit (91), so that...
... For displaying **electronic** program **guide** (**EPG**) that **provides** information on **television programs** .
...

... **DESCRIPTION** OF DRAWING(S
?

27/3,K/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

004578356
WPI Acc No: 1986-081700/198612
XRPX Acc No: N86-059871

Video still pictures editing method - establishing picture order viewing time and title of series of still pictures prerecorded on video discs

Patent Assignee: EASTMAN KODAK CO (EAST)
Inventor: MARTIN W A; SAWYER E G
Number of Countries: 007 Number of Patents: 008
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 8601619	A	19860313	WO 85US1550	A	19850819	198612	B
EP 191829	A	19860827	EP 85904209	A	19850819	198635	
JP 62500065	W	19870108	JP 85503684	A	19850619	198707	
US 4685001	A	19870804	US 84644099	A	19840824	198733	
US 4717971	A	19880105	US 8745262	A	19870409	198803	
EP 191829	B	19901031				199044	
DE 3580354	G	19901206				199050	
CA 1284214	C	19910514				199124	

Priority Applications (No Type Date): US 84644166 A 19840824; US 84644099 A 19840824
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 8601619	A	E	71		
Designated States (National): JP					
Designated States (Regional): DE FR GB NL					
EP 191829	A	E			
Designated States (Regional): DE FR GB NL					
EP 191829	B				
Designated States (Regional): DE FR GB NL					

...Abstract (Basic): procedure that specifies the arrangement and content of the file according to a set of **attributed** that are used to control the display of the pictures. The editing procedure is partitioned...

...of which may be initiated separately for organising the file according to one or more **attributes** **characteristic** of that level...

...level and particular picture for editing are selected, a message identifying the one or more **attributes** for the selected level is displayed, and indica are assigned to the **attributes** () for the selected pictures. The assigned indica are accumulated in a memory from which they may be recalled to display the selected pictures in the file according to the **attributes** of the level. (71pp Dwg.No.0/13)
...Abstract (Equivalent): level may be initiated separately for organizing the picture file according to one or more **attributes** **characteristic** of that level; selecting an editing level; selecting and displaying particular pictures for editing; displaying a message identifying said one or more **attributes** associated with the selected level; assigning indicia to the one or more **attributes** for the selected pictures; and storing the assigned indicia in a memory (20) from which...

...be recalled to display the selected pictures in the electronic picture file according to said **attributes** of the selected level as specified by the stored **attribute** indicia. (33pp)
...Abstract (Equivalent): to the magazine, and dependent upon different

File 348:EUROPEAN PATENTS 1978-2006/Feb W03
(c) 2006 European Patent Office
File 349:PCT FULLTEXT 1979-2006/UB=20060223,UT=20060216
(c) 2006 WIPO/Univentio

Set	Items	Description
S1	8663	(TELEVISION OR TV)(3N)(PROGRAM? OR GUIDE? OR NAVIGATION?)
S2	4379	EPG OR ELECTRONIC(3N)(GUIDE? OR SELECTIONS OR MENUS)
S3	6415	CLUSTER?(3N)(ANALYSIS? OR ANALY?ING OR EVALUAT? OR ALGORITHM? OR STATISTIC? OR SYSTEM?)
S4	58033	(SHOWS OR PROGRAMS OR MOVIES OR FILMS)(3N)(SUGGEST? OR RECOMMEND? OR PROVID? OR MATCH? OR SIMILAR? OR COMMON?)
S5	1454318	CHARACTERISTIC? OR FACTOR?? OR ATTRIBUT? OR DESCRIPTION?
S6	1397	(USER OR SUBSCRIBER? OR VIEWER?? OR PERSON OR CUSTOMER?)(3N)(MOOD OR EMOTION? OR FEELINGS OR STATE(3N)MIND OR HAPPY OR SAD OR MAD OR ANGRY OR ANXIOUS OR FEARFUL OR DRAMATIC OR RELAXING)
S7	43791	(SETS OR STATISTICAL(3N)ATTRIBUTE? OR CLUSTER? OR GROUPING? OR GROUP??)(5N)S5
S8	154	(CUSTOMI? OR PERSONAL?)(3N)S4
S9	591	AU=(ZHANG, D? OR WONG, W? OR PROKOPENKO, M? OR ISLAM, F? OR ZHANG D? OR WONG W? OR PROKOPENKO M? OR ISLAM F?)
S10	177	AU=(KOWALCZYK, R? OR OLDFIELD, M? OR BUTLER, M? OR TRAYERS, P? OR KOWALCZYK R? OR OLDFIELD M? OR BUTLER M? OR TRAYERS P?)
S11	1444	S5(5N)S4
S12	664	(CHOICE? OR AVAILABL? OR FUTURE(3N)SHOWING OR QUEUE?)(5N)S4
S13	1	S8(S)S6
S14	0	(S9 OR S10)(S)S6
S15	0	(S9 OR S10)(10N)(S3 OR S7)
S16	2	S11(S)S6
S17	2	S16 NOT S13
S18	58	(S3 OR S7)(S)(S1 OR S2)
S19	1	S18(S)S6
S20	1	S19 NOT (S13 OR S16)
S21	32	S6(S)S4
S22	5	S21(S)(S3 OR S7)
S23	2	S22 NOT (S19 OR S13 OR S16)
S24	7	S18(S)S4
S25	6	S24 NOT (S22 OR S19 OR S13 OR S16)
S26	3	S25 NOT AD=19990930:20060228/PR

13/3,K/1 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00836144 **Image available**
NETWORKED INTERACTIVE TOY SYSTEM
SYSTEME DE JOUETS INTERACTIFS EN RESEAU
Patent Applicant/Assignee:
CREATOR LTD, 16 Basel Street, 49001 Petach Tikva, IL, IL (Residence), IL (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
GABAI Oz, 156 Jabotinsky Street, 62330 Tel Aviv, IL, IL (Residence), IL (Nationality), (Designated only for: US)
GABAI Jacob, 14 Klee Street, 62336 Tel Aviv, IL, IL (Residence), IL (Nationality), (Designated only for: US)
SANDLERMAN Nimrod, 44 Churgin Street, 52356 Ramat Gan, IL, IL (Residence), IL (Nationality), (Designated only for: US)
WEISS Nathan, 7A Meltzer Street, 76285 Rehovot, IL, IL (Residence), IL (Nationality), (Designated only for: US)
VECHT-LIFSCHITZ Susan Eve, c/o Sanford T. Colb & Co., P.O. Box 2273, 76122 Rehovot, IL, IL (Residence), IL (Nationality), (Designated only for: US)
PFEFFER Zvika, 10 Bezalel Street, 64683 Tel Aviv, IL, IL (Residence), IL (Nationality), (Designated only for: US)
Legal Representative:
SANFORD T COLB & CO (agent), COLB, Sanford, T. , P.O. Box 2273, 76122 Rehovot (et al), IL,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200169830 A2-A3 20010920 (WO 0169830)
Application: WO 2001IL248 20010314 (PCT/WO IL0100248)
Priority Application: US 2000189914 20000316; US 2000189915 20000316; US 2000189916 20000316; US 2000190874 20000321; US 2000191300 20000321; US 2000192011 20000324; US 2000192012 20000324; US 2000192013 20000324; US 2000192014 20000324; US 2000193697 20000331; US 2000193699 20000331; US 2000193702 20000331; US 2000193703 20000331; US 2000193704 20000331; US 2000195861 20000407; US 2000195862 20000407; US 2000195863 20000407; US 2000195864 20000407; US 2000195865 20000407; US 2000195866 20000407; US 2000196227 20000410; US 2000197573 20000417; US 2000197576 20000417; US 2000197577 20000417; US 2000197578 20000417; US 2000197579 20000417; US 2000200508 20000428; US 2000200513 20000428; US 2000200639 20000428; US 2000200640 20000428; US 2000200641 20000428; US 2000200647 20000428; US 2000203175 20000508; US 2000203177 20000508; US 2000203182 20000508; US 2000203244 20000508; US 2000204201 20000515; US 2000204200 20000515; US 2000207126 20000525; US 2000207128 20000525; US 2000208105 20000526; US 2000208390 20000530; US 2000208391 20000530; US 2000208392 20000530; US 2000209471 20000605; US 2000210443 20000608; US 2000210445 20000608; US 2000212696 20000619; US 2000215360 20000630; US 2000216237 20000705; US 2000216238 20000705; US 2000217357 20000712; US 2000219234 20000718; US 2000220276 20000724; US 2000221933 20000731; US 2000223877 20000808; US 2000227112 20000822; US 2000229371 20000830; US 2000229648 20000831; US 2000231105 20000908; US 2000231103 20000908; US 2000234883 20000925; US 2000234895 20000925; US 2000239329 20001010; US 2000253362 20001127; US 2000250332 20001129; US 2000254699 20001211; US 2001267350 20010208
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 189040

Fulltext Availability:
Detailed Description

Detailed Description
... several forms. In one form one or more users purchase a particular character whose content **provider provides programs** or scripts which animate features and personalities of specific characters.

The aforementioned modular technology'is...the like).

Ili another preferred embodiment of this invention, a toy responds to "currently defined **mood** ", with appropriate behavior improvement interaction package.

In another preferred embodiment of this invention, a toy...
?

17/3,K/1 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00784125
SYSTEM, METHOD, AND ARTICLE OF MANUFACTURE FOR PIECEMEAL RETRIEVAL IN AN INFORMATION SERVICES PATTERNS ENVIRONMENT
SYSTEME, PROCEDE ET ARTICLE DE FABRICATION DESTINES A LA RECHERCHE FRAGMENTAIRE DANS UN ENVIRONNEMENT DE MODELES DE SERVICES D'INFORMATIONS
Patent Applicant/Assignee:
ACCENTURE LLP, 1661 Page Mill Road, Palo Alto, CA 94304, US, US (Residence), US (Nationality)
Inventor(s):
BOWMAN-AMUAH Michel K, 6426 Peak Vista Circle, Colorado Springs, CO 80918, US,
Legal Representative:
HICKMAN Paul L (agent), Oppenheimer Wolff & Donnelly, LLP, 38th Floor, 2029 Century Park East, Los Angeles, CA 90067-3024, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200116705 A2-A3 20010308 (WO 0116705)
Application: WO 2000US24085 20000831 (PCT/WO US0024085)
Priority Application: US 99386433 19990831
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE GH GM HR HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ VN YU ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 150355

Fulltext Availability:
Detailed Description

Detailed Description
... the data retrieval mechanism calls being placed directly within the domain
obj ect;
Figure 160 **shows** the interrelationship between a database, a persist, and an account; Figure 161 illustrates that the...server system by including an audience which is external to the company can result in **dramatic** increases in system usage. The additional demand and increased usage placed on existing legacy systems...

17/3,K/2 (Item 2 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00164699
STEREOLITHOGRAPHIC BEAM PROFILING
PROFILAGE DE FAISCEAU STEREOLITHOGRAPHIQUE
Patent Applicant/Assignee:
3D SYSTEMS INC,

Inventor(s):
SPENCE Stuart Thomas,
TARNOFF Harry,
ALMQUIST Thomas,
Patent and Priority Information (Country, Number, Date):
Patent: WO 8911085 A1 19891116
Application: WO 89US1559 19890417 (PCT/WO US8901559)
Priority Application: US 88830 19880418; US 88816 19881108; US 88837 19881108; US 88907 19881108; US 88801 19881108
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
JP KR
Publication Language: English
Fulltext Word Count: 292227
Fulltext Availability:
Detailed Description

Detailed Description
... of the letters significant,
5.4 The Supervisor's Keyboard Commands
While the Supervisor is **relaxing** and counting down the wait period, you can now take one of four actions.

lo...
?

20/3,K/1 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00761432
METHODS, CONCEPTS AND TECHNOLOGY FOR DYNAMIC COMPARISON OF PRODUCT FEATURES AND CUSTOMER PROFILE
PROCEDES, CONCEPTS ET TECHNIQUE DE COMPARAISON DYNAMIQUE DE CARACTERISTIQUES D'UN PRODUIT ET DU PROFIL DES CONSOMMATEURS
Patent Applicant/Assignee:
ACCENTURE LLP, 100 South Wacker Drive, Chicago, IL 60606, US, US (Residence), US (Nationality)
Inventor(s):
GUHEEN Michael F, 2218 Mar East Street, Tiburon, CA 94920, US,
MITCHELL James D, 3004 Alma, Manhattan Beach, CA 90266, US,
BARRESE James J, 757 Pine Avenue, San Jose, CA 95125, US,
Legal Representative:
BRUESS Steven C (agent), Merchant & Gould P.C., P.O. Box 2903, Minneapolis, MN 55402-0903, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200073958 A2 20001207 (WO 0073958)
Application: WO 2000US14459 20000524 (PCT/WO US0014459)
Priority Application: US 99320818 19990527
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 151011

Fulltext Availability:
Detailed Description

Detailed Description
... new system and the I 0 development environment are defined through this process.

Security Standards, **Guidelines** and Procedures
Security standards, **guidelines** and procedures provide security direction to the implementation. They will help define how the security
...
?

23/3,K/1 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00806384
NETWORK AND LIFE CYCLE ASSET MANAGEMENT IN AN E-COMMERCE ENVIRONMENT AND METHOD THEREOF
GESTION D'ACTIFS DURANT LE CYCLE DE VIE ET EN RESEAU DANS UN ENVIRONNEMENT DE COMMERCE ELECTRONIQUE ET PROCEDE ASSOCIE
Patent Applicant/Assignee:
ACCENTURE LLP, 1661 Page Mill Road, Palo Alto, CA 94304, US, US (Residence), US (Nationality)
Inventor(s):
MIKURAK Michael G, 108 Englewood Blvd., Hamilton, NJ 08610, US,
Legal Representative:
HICKMAN Paul L (agent), Oppenheimer Wolff & Donnelly, LLP, 38th Floor, 2029 Century Park East, Los Angeles, CA 90067-3024, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200139030 A2 20010531 (WO 0139030)
Application: WO 2000US32324 20001122 (PCT/WO US0032324)
Priority Application: US 99444775 19991122; US 99447621 19991122
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CU CZ DE DK DZ EE ES FI GB GE GH GM HR HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ VN YU ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 171499

Fulltext Availability:
Detailed Description

Detailed Description
... to one based on ATM cell switching. While changes in the accompanying network will be **dramatic** , it would be desirable for users making the transition to be able to retain their...Table 41B.

Z5
94
Locking Shift Codeset 6 Parameter.
Code: 11000001
Type: 0
Byte #, Bit **Description**
byte 1, bits 0-4 Type of Digits : Indicates the contents of the parameter.

This...Context can include any information but frequently contains information such as the device name, problem **description** , and priority.

1 5 Electronic Mail Messap, 4630 - An internet mail message send using the...

23/3,K/2 (Item 2 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00802534
ANY-TO-ANY COMPONENT COMPUTING SYSTEM
SYSTEME INFORMATIQUE A COMPOSANTS TOUTE CATEGORIE
Patent Applicant/Assignee:
E-BRAIN SOLUTIONS LLC, 1200 Mountain Creek Road, Suite 440, Chattanooga, TN 34705, US, US (Residence), US (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
WARREN Peter, 1200 Mountain Creek Road, Suite 440, Chattanooga, TN 37405, US, GB (Residence), GB (Nationality), (Designated only for: US)
LOWE Steven, 1625 Starboard Drive, Hixson, TN 37343, US, US (Residence), US (Nationality), (Designated only for: US)
Legal Representative:
MEHRMAN Michael J (agent), Paper Mill Village, Building 23, 600 Village Trace, Suite 300, Marietta, GA 30067, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200135216 A2-A3 20010517 (WO 0135216)
Application: WO 2000US31231 20001113 (PCT/WO US0031231)
Priority Application: US 99164884 19991112
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 275671

Fulltext Availability:
Claims

Claim
... then - given the same input software can behave with these aspects of data in a **similar** way to the way a human behaves. For example, a secretary will not normally receive...in the Matter Data Category, this is intrinsically not a single matter thing, but a **group** of matter things. (See **description** of Matter **groups** undder the Matter data category heading). The Any-to-Any machine method for creating a...
?

26/3,K/1 (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01898247
Systems and methods for secure transaction management and electronic rights protection
Systeme und Verfahren zur Verwaltung von gesicherten Transaktionen und zum Schutz von elektronischen Rechten
Systemes et procedes pour gerer des transactions securisees et pour proteger des droits electroniques
PATENT ASSIGNEE:
Intertrust Technologies Corp., (2434320), 460 Oakmead Parkway, Sunnyvale, CA 94086-4708, (US), (Applicant designated States: all)
INVENTOR:
Ginter, Karl L., 10404 43rd Avenue, Beltsville,Maryland 20705, (US)
Shear, Victor H., 5203 Battery Lane, Bethesda,Maryland 20814, (US)
Spahn, Francis J., 2410 Edwards Avenue, El Cerrito,California 94530, (US)
Van Wie, David M., 1250 Lakeside Drive, Sunnyvale,California 94086, (US)
LEGAL REPRESENTATIVE:
Smith, Norman Ian et al (36041), fJ CLEVELAND 40-43 Chancery Lane, London WC2A 1JQ, (GB)
PATENT (CC, No, Kind, Date): EP 1531379 A2 050518 (Basic)
EP 1531379 A3 060222
APPLICATION (CC, No, Date): EP 2004078195 960213;
PRIORITY (CC, No, Date): US 388107 950213
DESIGNATED STATES: AT; BE; CH; DE; DK; ES; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE
RELATED PARENT NUMBER(S) - PN (AN):
EP 861461 (EP 96922371)
INTERNATIONAL PATENT CLASS (V7): G06F-001/00; G06F-017/60
INTERNATIONAL CLASSIFICATION (V8 + ATTRIBUTES):
IPC + Level Value Position Status Version Action Source Office:
G06F-0001/00 A I F B 20060101 20050315 H EP
G06F-0017/60 A I L B 00000000 20050315 H EP
ABSTRACT WORD COUNT: 151
NOTE:
Figure number on first page: 75

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:
Available Text Language Update Word Count
CLAIMS A (English) 200520 173
SPEC A (English) 200520 167172
Total word count - document A 167372
Total word count - document B 0
Total word count - documents A + B 167372
...SPECIFICATION sub-system) with in-place control information through a negotiation process involving both control information **sets** . For example, the modification, within the secure sub-system of a content provider's VDE...

...security pathway(s) of handling, reporting, and/or payment; content control and administration; and human **factors** (e.g. user interfaces).) support the operation of a plurality of clearinghouses, including, for example...features further support employing modern language tools that allow one or more users to make **selections** from choices and provide answers to questions and to produce a VDE electronic agreement from...

...access and differing budgets limiting database usage can be applied to

these client individuals and **groups** . Enabling content providers and users to practically employ such diverse **sets** of user identification, metering, budgeting, and billing control information results, in part, from the use...and

(6) certain parties described by electronic information.

VDE supports commercially secure "extended" value chain **electronic** agreements. VDE can be configured to support the various underlying agreements between parties that comprise...ambiguous. For example, commonly used "application" functions (such as determining the structure and/or other **attributes** of a content container) may be incorporated into an operating system. Furthermore, "operating system" functions... modification of each summary can be controlled by its own access tag.

The following table **shows** an example of a list of PPE summary service manager 560 service calls:

In the...

26/3,K/2 (Item 2 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

01869029

Systems and methods for secure transaction management and electronic rights protection

Systeme und Verfahren zur gesicherten Transaktionsverwaltung und elektronischem Rechtsschutz

Systemes et procedes de gestion de transactions securisees et de protection de droits electroniques

PATENT ASSIGNEE:
ELECTRONIC PUBLISHING RESOURCES, INC., (976840), 460 Oakmead Parkway, Sunnyvale, CA 94086-4708, (US), (Applicant designated States: all)

INVENTOR:
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Spahn, Francis J., 2410 Edwards Avenue, El Cerrito, California 94530, (US)
Van Wie, David M., 1250 Lakeside Drive, Sunnyvale, California 94086, (US)

LEGAL REPRESENTATIVE:
Smith, Norman Ian et al (36041), fJ CLEVELAND 40-43 Chancery Lane, London WC2A 1JQ, (GB)

PATENT (CC, No, Kind, Date): EP 1515216 A2 050316 (Basic)
EP 1515216 A3 050323
APPLICATION (CC, No, Date): EP 2004078194 960213;
PRIORITY (CC, No, Date): US 388107 950213
DESIGNATED STATES: AT; BE; CH; DE; DK; ES; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE
RELATED PARENT NUMBER(S) - PN (AN):
EP 861461 (EP 96922371)
INTERNATIONAL PATENT CLASS (V7): G06F-001/00; G06F-017/60
ABSTRACT WORD COUNT: 144
NOTE:
Figure number on first page: 75C

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200511	276
SPEC A	(English)	200511	167210
Total word count - document A			167486
Total word count - document B			0

Total word count - documents A + B 167486

...SPECIFICATION of information, business market model, and/or personal objectives.
Employing VDE as a general purpose **electronic** transaction/distribution control system allows users to maintain a single transaction management control arrangement on...A VDE content container is an object that contains both content (for example, commercially distributed **electronic** information products such as computer software programs, movies, electronic publications or reference materials, etc.) and...fragments/routines (e.g., bootstrap routines) for execution by SPE 503.
Library routines 574 may **provide** a standard set of library functions in ROM 532. A standard list of such library...

26/3,K/3 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00775308 **Image available**
A SYSTEM, METHOD AND COMPUTER PROGRAM FOR DETERMINING OPERATIONALMATURITY OF AN ORGANIZATION
SYSTEME, PROCEDE ET ARTICLE FABRIQUE PERMETTANT DE MESURER LA MATURITE OPERATIONNELLE D'UNE ORGANISATION D'OPERATIONS
Patent Applicant/Assignee:
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WINN Colleen R, 11472 Fairfield Road #103, Minnetonka, MN 55305, US, US (Residence), US (Nationality), (Designated only for: US)
Legal Representative:
HICKMAN Paul L (agent), Oppenheimer Wolff & Donnelly LLP, 2029 Century Park East, Suite 3800, Los Angeles, CA 90067-3024, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200108038 A2-A3 20010201 (WO 0108038)
Application: WO 2000US20399 20000726 (PCT/WO US0020399)
Priority Application: US 99361781 19990726
Designated States:
(Protection type is "patent" unless otherwise stated - for applications prior to 2004)
AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 77349

Fulltext Availability:
Detailed Description

Detailed Description
... can communicate with each other. Encapsulation protects the
8

Class libraries are very flexible. As **programs** grow more complex, more programmers are forced to reinvent basic solutions to basic problems over ...and responsibilities.

The commitments, expectations, and responsibilities are documented and agreed upon within the project **group** . Commitment may be obtained by negotiation, by using input and feedback, or through joint development... capability of the IT organization. The interview aids are used by the assessment team to **guide** them through interview sessions with assessment participants.

Assessment participants prepare documentation for the assessment team...
?

Advanced TV Navigation System with Easy Program Selection Method

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Abstract

We have developed an experimental TV navigation system to assist viewers in selecting appropriate TV programs even when there are many digital broadcasting channels. This report describes a new system configuration and algorithm that can provide various navigation methods to suit a viewer's wishes, using an on screen electronic program guide with various standard style sheets at HDTV resolution.

Introduction

In Japan, satellite digital broadcasting began in December 2000, and terrestrial digital broadcasting will begin in December 2003, making HDTV and interactive TV a reality. With the associated increase in the number of channels and kinds of program, an advanced TV navigation system is needed. This should be suitable for various kinds of viewers, without distinction in age or sex, and should make it easy to select programs and watch television comfortably. We have already conducted a study on an advanced TV navigation system to assist viewers in selecting appropriate TV programs even when many channels are available.

Recently, we have developed a new experimental TV navigation system [1]. This includes an innovative system configuration and an algorithm that can provide various navigation methods to suit the viewer's wishes. It uses an on screen electronic program guide, including various standard style sheets at HDTV resolution.

In this system, the viewing habits of TV viewers are divided into four major categories as follows [2]:

(a) Concentrated viewing
(b) Viewing TV while doing something else
(c) Diversion viewing
(d) Diversion viewing while doing something else

This experimental system includes a viewer profile database that stores the viewer interests and preferences. It also has a program information database, which stores broadcast schedules, that are continuously updated using service information (SI) data transmitted over the digital broadcasting channel, and this system is designed to have an interactive human interface equipped with flexible pointing devices suitable for various kinds of viewers.

Total system overview

The system overview for advanced TV navigation system is shown in Figure 1.

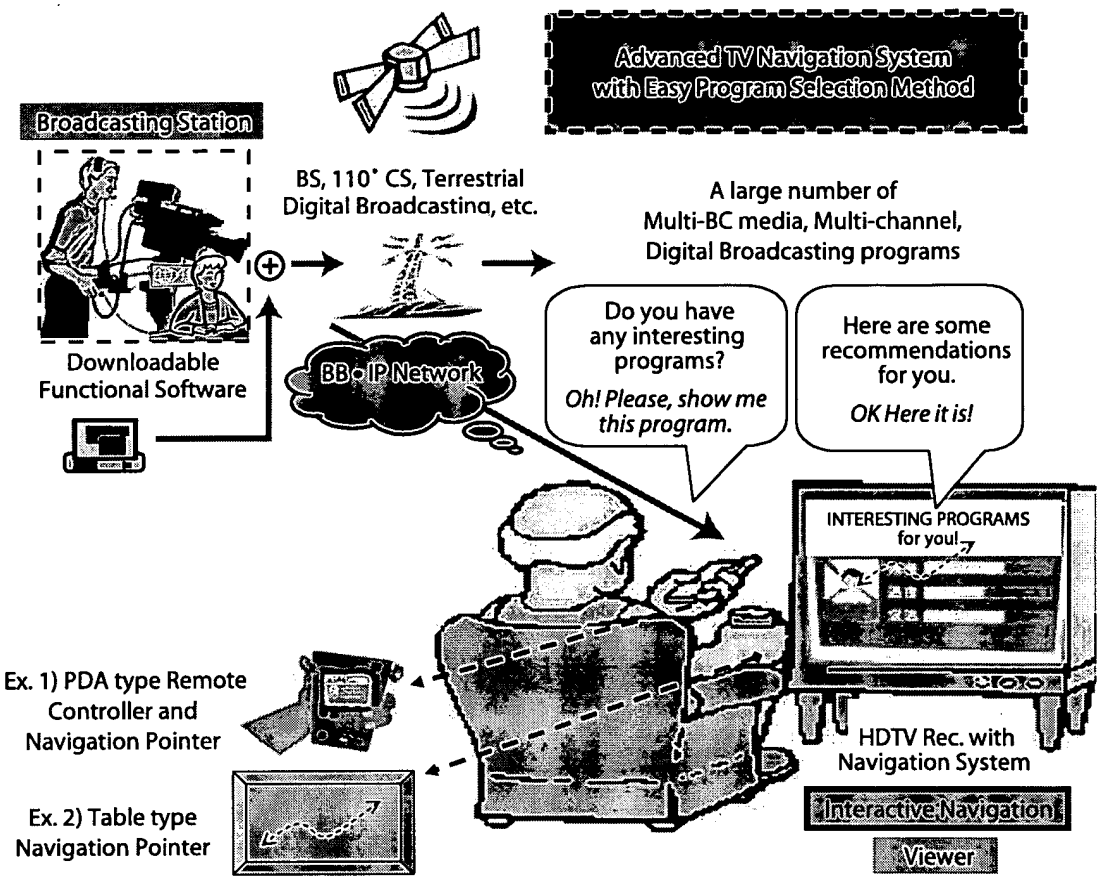

Figure 1: Total System Image for Advanced TV navigation System

In this figure, the top-left corner shows a digital broadcasting station and the bottom-right corner shows a reception environment for digital broadcasting in the home, transmitting via satellite or terrestrial, including broadband Internet. Also an old viewer is trying to select a program with the TV navigation system.

The expected functions of digital TV

The NHK Broadcasting Culture Institute has recently reported about the result of a survey concerning modern TV viewer's attitudes in Japan. This survey was carried out as a memorial event for 50 years of TV in October 2002. Figure 2 shows one of the simplified results of the survey of users expected functions of digital TV, in order of the number of replies, where multiple replies were allowed.

Looking at this data, we can find out several functions required of a digital TV-set and also of an advanced TV navigation system:

1 More than half of viewers want a 'Home Video-server Function' so they can watch any program they want, whenever they want.

2 One half to one quarter of viewers want functions such as more-channels, 'Program-linked Data Broadcasting', and HDTV - so they expect to be able to select their required program from within a large number of programs, with additional data on the requested programs and additional picture clarity of HDTV.

3 Surprisingly, less than one fifth of viewers want 'Multi-angle', 'Internet Display' and an EPG. Perhaps, the reason for this result is that digital broadcasting has just started, and viewers do not yet understand the convenience of these functions. We can guess that at this time viewers think of a PC style interface - which is not easy to use, especially for older people - and think of an EPG as being the same as a grid-based TV listings like in a newspaper or magazine.

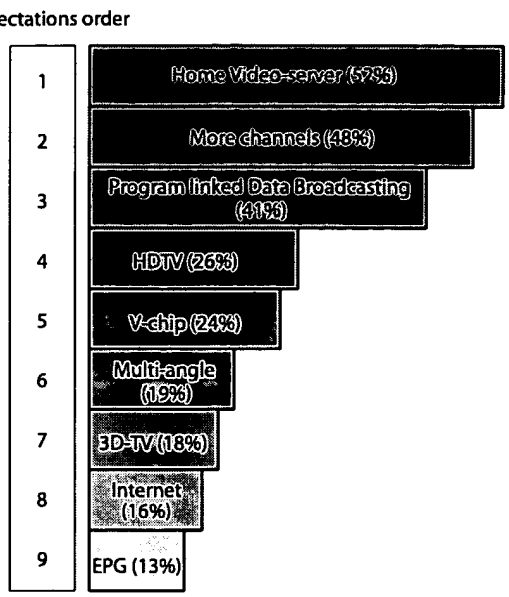

Figure 2: Users Expected Functions of Digital TV (NHK Oct 2002)

From the replies to this survey, we can propose a new target for the development of an advanced TV navigation system for the digital broadcasting age, where viewers are assisted in the easy selection of a program even when many programs are being broadcast simultaneously, and the system collaborates in TV navigation functions to select programs using the 'Home Video-server' function,'HDTV' function, 'Internet Display' function and also EPG function.

Experimental system configurations for advanced TV navigation

Figure 3 shows an example block diagram of the system configuration for a multi-channel digital broadcasting receiver with an interactive TV navigation scheme, where the upper half denotes a conventional digital HDTV receiver, enabling multi-reception for BS (broadcasting satellite), 110E CS (communication satellite), and terrestrial broadcasting, and the lower half shows an additional part for an interactive TV navigation scheme equipped with a program information database that stores broadcast schedules, that is continuously updated using service information (SI) data transmitted over the digital broadcasting channel, and an interactive human interface with flexible pointing devices which are suitable for various kinds of viewers.

Figure 4 also shows an example of an experimental scheme for Interactive TV navigation system, where two software engines - one for retrieval/sorting of the service information database, the other for drawing recommendations from the user profile database - are installed, multiplexed by the HI controller, and passed to the HDTV display and the simple human interface such as a navigation pointing tool to select items with ease to use for various viewers[3].

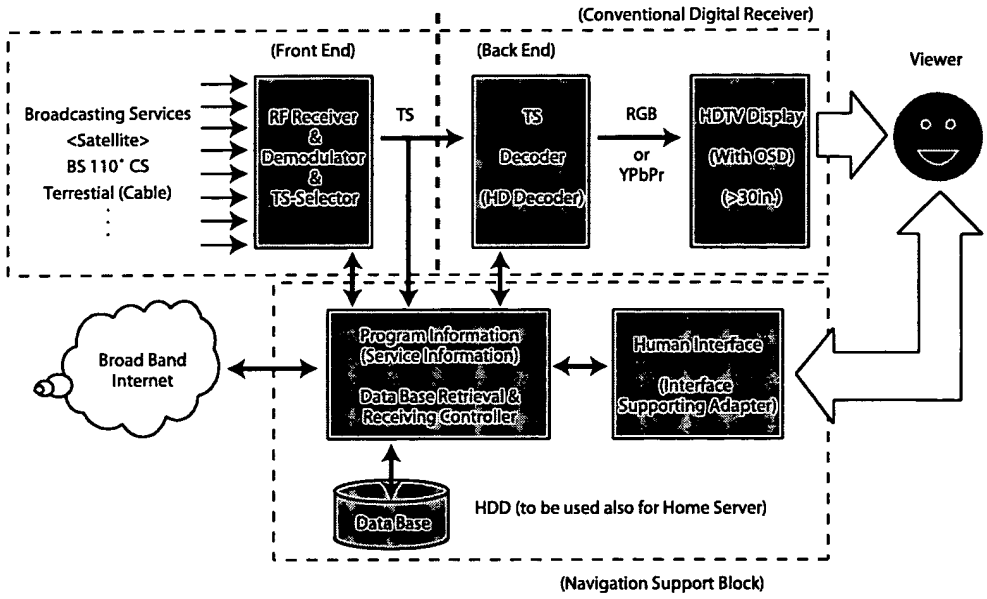

Figure 3: Block Diagram of System Configuration for multi-channel Digital Broadcasting Receiver with Interactive TV Navigation Scheme

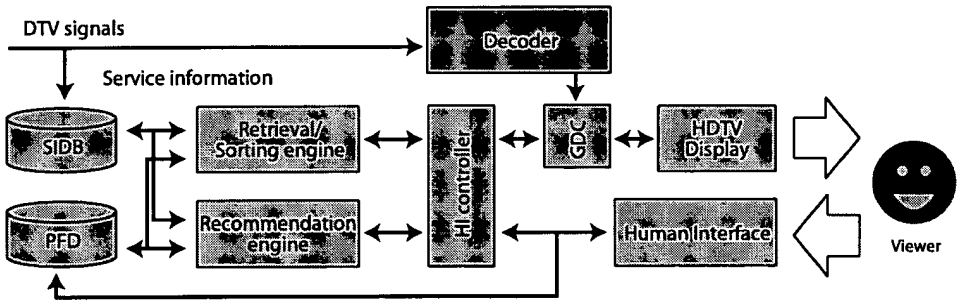

Figure 4: An Experimental Scheme for Interactive TV Navigation System

Viewing habits and TV navigation system

Average TV watching time has remained around three and a half hours per day in Japan. The recent tendency of viewing habits can be summarized as 'Background TV'-style viewing [2]. This is an attitude with no particular purpose to get knowledge or information, only to 'spend the time with easy and comfortable feeling'. Viewing habits including this and traditional information-oriented ones are generally classified as follows.

(a) Concentrated viewing (Viewing with purpose)

(b) Viewing TV while doing something else (Alternating between viewing while doing something else and viewing with purpose)

(c) Diversion viewing (Diversion viewing with no set purpose)

(d) Diversion viewing while doing something else ('Background TV'-style viewing)

Compared to habits (a) and (b), habits (c) and (d) can be treated as passive TV viewing. Such viewing habits are not fixed for any one viewer but change according to the time of day or viewer mood. A TV navigation system must be able to deal with any variety of viewing habits and with their tendency to change.

As shown in Figure 3 and 4, the experimental TV navigation scheme with human interface has multiple digital RF tuners and decoders for digital TV signals, and the resulting TV programs are displayed on the HDTV screen, after selection by the navigation process, which is also displayed on the HDTV display as an OSD (On Screen Display). The stages of the navigation process are given below.

The digital TV signals contain the content descriptions such as titles, summaries, classifications of broadcasting programs and their broadcasting schedule as service information (SI) [7] [8]. The schedule for a whole week is stored in the SI database (SIDB). Viewer information such as age, sex and program preference are implicitly or explicitly stored as profile data (PFD), which also contain his or her prevalent mood. With reference to the SIDB and PFD, the program retrieval and sorting engine and the program recommendation engine selects programs and shows them on the display. The viewer selects the program through interactive operations and watches it. The following three methods of selection are available in connection with the foregoing four viewing habits.

1 Retrieval: The viewer watches programs related to items of interest if available.
2 Sorting: The viewer selects and watches a program from among those that are currently being broadcast.
3 Recommendation: The viewer watches a program recommended by the system as optimal or selects a program from those recommended as suitable for the way the viewer would like to pass the time.

Table 1 shows an outline of reference data, program sorting algorithm, the number of operations for each selecting method, including the number for evaluation test methods.

<table>
<tr><th colspan="2">Test methods</th><th>Selecting methods</th><th>SI data</th><th>Profile data</th><th>TV navigation system operation</th><th>No. ops</th></tr>
<tr><td rowspan="3">III</td><td rowspan="2">I</td><td>(1) Program Retrieval</td><td>event name, text information (event descriptor)</td><td rowspan="2">None</td><td>Displays event names of all the broadcast programs, person names and place names included in the program description as candidate words. Retrieves programs with the word chosen by the viewer.</td><td>>5</td></tr>
<tr><td>(2) Program Sorting</td><td rowspan="2">content nibble level 1, level 2 (content descriptor), event name, text information</td><td rowspan="2">age, sex and preference mood/ motivation</td><td>The viewer sorts one from all the programs using the timetable displayed in layers according to program classification. Selection from a specified interest area adapted to the viewer is also possible.</td><td>3,4</td></tr>
<tr><td>II</td><td>(3) Program Recom-mendation</td><td>Programs adapted to the time zone and interest area are recommended. The viewer can also choose a program right for his or her prevalent mood (relaxing, informative, dramatic).</td><td>0,1</td></tr>
</table>

Table 1: Program selecting methods

Subjective evaluation tests

Evaluation tests were conducted to examine how the users respond to the TV navigation system. This was intended as a rough evaluation of the program selection process including program recommendation. In this tests, three selection methods, **I**: retrieval/sorting, **II**: recommendation and **III**: both of retrieval/sorting and recommendation were given as parameters. And also, two types of TV viewing, **am**: morning and **pm**: evening was also set. For the evaluation tests, 30 evaluators in total were chosen, male and female, younger people (in their 20s and 30s) and older people (over 65).

For general evaluation, the extent that they actually want to use this system was measured in a hundred point scale, asking about subjects of all six selection methods **Iam–IIpm** after being given the following instruction:

'Assuming that a TV receiver having these types of program-selection methods was installed in your home, and that you would use the three selection methods that you were earlier shown in the two scenarios given, please evaluate each selection method in terms of "I would like to use this" with 100 points being the highest score.'

Users' feedback about the program selection operations using the TV navigation system was rated in five ranks depending on how far 24 pairs of adjectives and adjective verbs were considered applicable.

The program recommendation process handles programs that are currently being broadcast as well as programs that will be starting shortly. Generally speaking, however, it is not difficult to imagine how the types of programs one desires and even their method of selection might change according to the scenario in which one watches television within the course of a day. In the morning, for example, a viewer might want to check out the news and the weather report for that day, while in the evening, when relaxing after dinner, the same viewer might like to watch a more dramatic or entertaining program such as a movie, drama, or live sports event.

In this case, we assumed some criteria of personal weighting factor for preference mood/motivation for a user to select a program for the purpose, according to the time zone of a day, for example, morning ,afternoon, evening and night, dividing into several cases of users conditions that how they spend the time in these zones, adding weight based on viewer preferences.

Table 2 shows an example of how personal preferences change according to time of day in terms of three program attributes: relaxing, informative, and dramatic.

Time zone		**Morning**	**Afternoon**	**Evening**	**Night**
How to spend time?	relaxing	20	50	30	60
	informative	70	30	20	20
	dramatic	10	20	50	20

Table 2: Examples for personal weighting factor

Figure 5 shows an example of display information, which is flexibly designed and described in XML. Other related examples are shown in Figure 7 at the end of this paper.

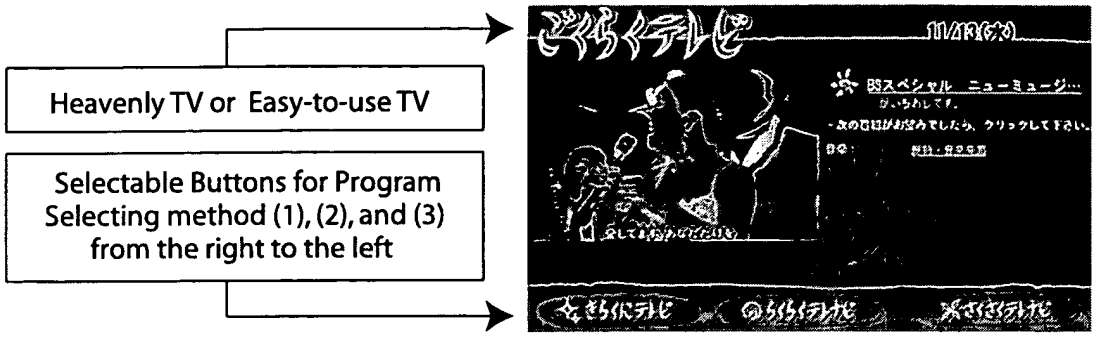

Figure 5: An example of TV Navigation portal Menu with an HDTV Video Window, designed for young women and described in XML

Results of the tests

Figure 6 shows average values and standard deviation of the evaluation results. Standard deviation ranged from 10 to 16 points, and the following characteristics could be observed, even if a significant difference could not be said to exist.

1 On comparing in terms of scenarios for using the TV navigation system, watching in the morning was found to have a high evaluation for selection procedure **II** while watching in the evening had a high evaluation for selection procedures **I** and **III**.
2 For the younger age group, a difference of 10 or more evaluation points for each selection method could be seen between **am** and **pm**, and for the older age group, that difference was small.
3 Selection procedure **II** (recommend) received a high evaluation in the morning while selection procedure **III** (the combination of recommend, sort, and retrieve) received a high evaluation in **pm**.

We can interpret the above findings as saying that program recommendation as a guidance method of a TV navigation system is useful for a younger age group in the morning, a busy time in the day for such viewers. They also indicate that the combination of sorting and retrieval is useful for an older age group at any time of day.

To clarify how the TV navigation system was evaluated, we performed a principal component analysis on the evaluation by impressions for all subjects with respect to the 24 adjective and adverb pairs. From this evaluation, the contribution rate of the first principal component is 40.2%, that of the second one is 15.0% and that of the third one is 5.3% for a total of 60.5%, showing that the first component is understood as 'efficient', the second as 'rich and pleasurable' and the third as 'easy', respectively.

The TV navigation system offers a program selection aid for digital TV broadcasting. The system recommends programs suited for viewers. As a result of subjective evaluation tests on the system, it was found that the program recommendation facility was highly evaluated by both younger and older people.

We confirmed that the program recommendation engine is necessary for this kind navigation system, however, further improvement will be made to the program recommendation engine and the sorting and retrieval engine in view of the examined relationship between the actual operation of SI and the viewers' preference.

Recently, we found the similar articles described for 'Personalized Electronic Program Guides for Digital TV' [4] and others [5], [6]. Their systems are mainly designed to be a content recommendation system or personalized EPG system for digital TV, using a PC-based system architecture combined with a web-based schedule database. On the other hand, our navigation system is designed to be a new receiving system to assist viewers to select programs easily among a large number of digital programs according to viewer's wishes, using an on-screen electronic program guide with various standard style sheets at HDTV resolution.

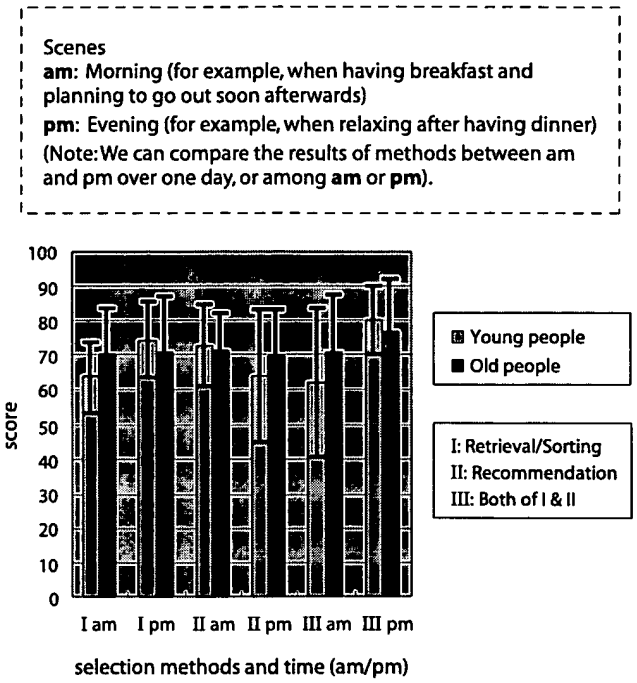

Figure 6: Result of general evaluation

Navigation tool to assist human interface

From the results which have already been described above, our research efforts must be aimed at a TV navigation system personalized to a wider range of viewers through a universally designed human interface.

When we select a program, first we must select items displayed on the TV screen with some pointing device, such as a mouse. It would be good if we could use a PC style pointing device, even though the viewer may be found over a range of distances from the TV, for instance from 3 to 5 meters away. For this purpose, we are now developing two types of navigation pointer, one is a remote controller type navigation pointer and the other is a touch sensitive device, where viewers may select programs on the device in their hands as if they were touching the TV screen, even though it may be several meters away. An illustration of sample usage of these devices is shown in Figure 1 as Ex.1) PDA type Remote Controller and Navigation Pointer, and Ex.2) Tablet type Navigation Pointer. In these cases, the resultant pointing data for users to select program items are sent to the TV navigation system, using some wireless technologies, including small power radio and infrared transmission.

Conclusions

We have developed an advanced TV navigation system, where different kinds of viewers can select programs easily, and watch TV in comfort.

This paper described the overall system overview and the concept behind our TV navigation system, with its newly developed algorithms and its interactive interface

for the new age of digital HDTV broadcasting, both satellite and terrestrial. When the TV navigation system has been realized, assistance will be provided so that users can select the program they want quickly and easily, using on-screen TV navigation guides at HDTV resolution. If equipped with a 'Home Video-server' function, viewer will even be able to watch their requested program several days later.

Furthermore, our research efforts will continue, aimed at developing a TV navigation system which can be flexibly personalized for a wider range of viewers through a standard and universal human interface.

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Acknowledgments

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Our deepest thanks are given to Dr. Y. Shishikui of NHK Science & Technical Research Laboratories, Ms. Y. Hara of NHK Broadcasting Culture Institute, and Mr. H. Kaneta of AI Sonic Corporation for their informative discussion.

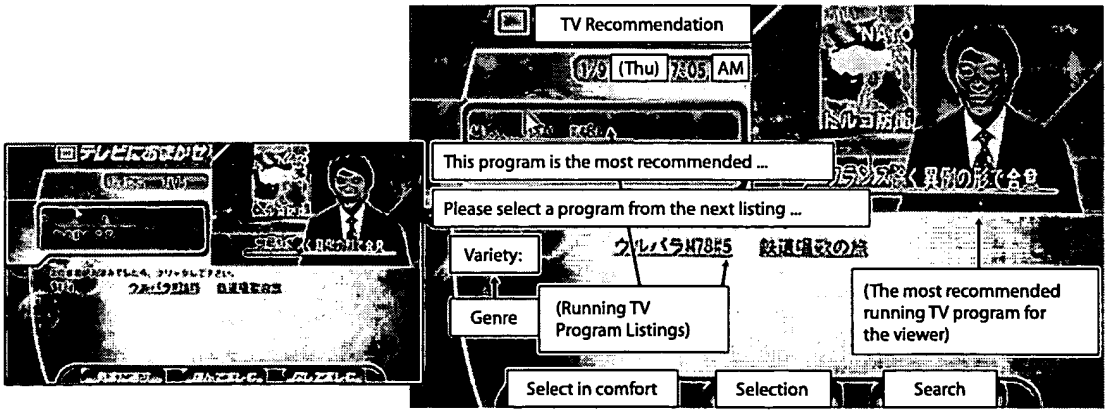

Figure 7: Examples of Display Information for TV Navigation

Figure 7 (a): An example of the Program Recommendation Menu with an HDTV Video Window

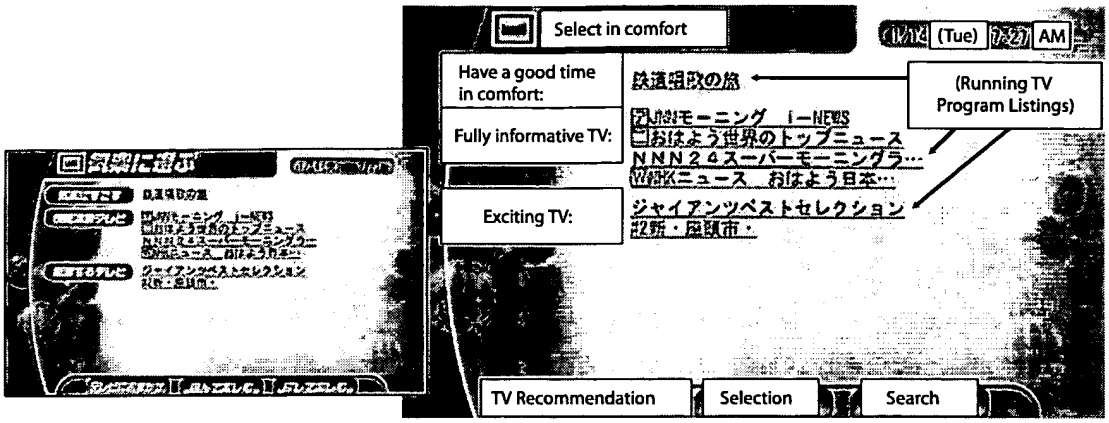

Figure 7 (b): An example of the User's Mood Submenu in the Program Selection Menu

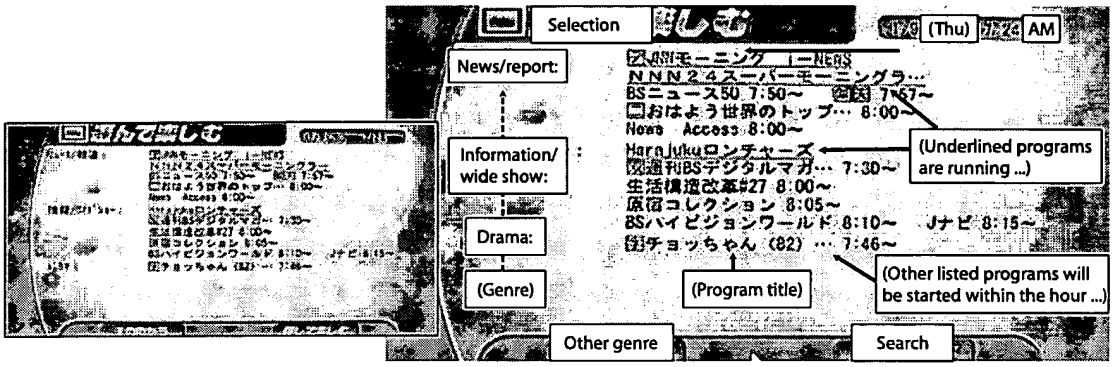

Figure 7 (c): An example of the User's Genre Submenu in the Program Selection Menu

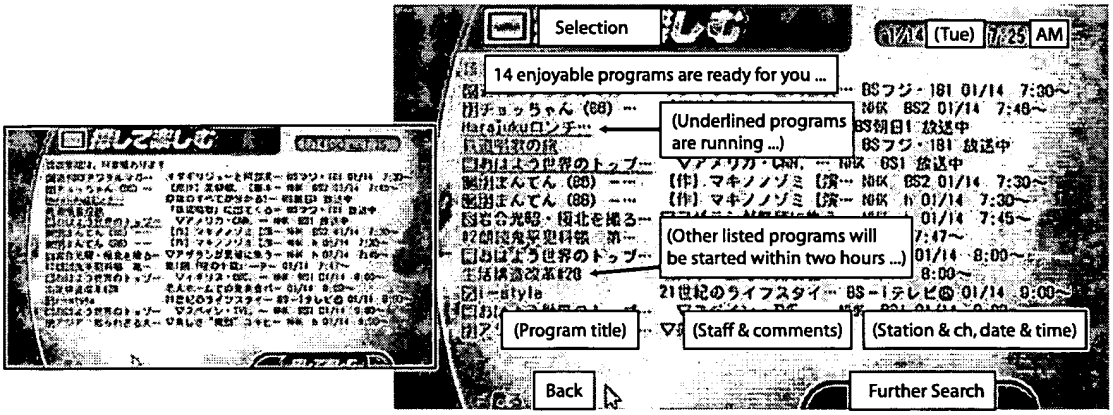

Figure 7 (d): An example of the Program Search Submenu in the Program Selection Menu

Development and Features of a TV Navigation System

Tadashi Isobe, Masao Fujiwara, Hiroyuki Kaneta,
Noriyoshi Uratani, and Toshiya Morita

Abstract —*A TV navigation system has been developed to make it easier for viewers to watch television in a multi-channel era. It enables viewers to watch programs recommended by the system as well as to select programs using a personalized electronic program guide (EPG) and retrieve programs with a personal filter. The system combines a mechanism for recommending programs in accordance with the preferences and mood of the viewer with personalized program sorting and retrieving in an easy-to-use format. Subjective evaluation tests were held to evaluate the impressions of general viewers with regard to operating this TV navigation system and benefiting from its use. It was found that program recommendations were helpful and that the types of programs desired by a viewer and their method of selection differed according to time of day.*

Index Terms — personalized TV guides, program recommendation, subjective evaluation test, TV navigation

1. Introduction

The digitization of television is improving quality as in HDTV and adding functionality as in data broadcasts combined with programs. The dramatic progress made in compression-coding technology, moreover, is giving birth to a multi-channel era. There is true concern, however, that this trend toward multi-functional and multi-channel television will deliver more information than viewers can handle resulting in information overload. In such a situation, it becomes difficult to select a program that one would like to watch, and even if one knows about a program that one wants to watch, there is always the possibility of missing that program. The need is therefore felt for a TV navigation system that can eliminate this difficulty and worry in program selection and make it easy for the viewer to find and watch desired programs from the many and varied programs available.

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When envisioning digital television of the future, one issue that arises in relation to its spread and advancement is how viewers will go about accessing programs [1]. In Japan, this issue has been duly recognized, and researchers have studied agent-based reception environments and indexing of video segments as part of Integrated Services Digital Broadcasting (ISDB) [2]. There have also been reports on IEEE related development of a smart electronic program guide (EPG) that recommends programs in accordance with a user profile [3]; on the development and operation of a personalized television listings system (PTV) that presents a personalized program guide via the Internet optimized by viewer reaction [4], [5]; and on personalized program recommendation systems using e-commerce techniques and new concepts in interactive television [6]. All of these studies on TV navigation were considered as performed on the premise that a viewer wishes to watch certain types of programs.

Taking recent trends in television viewing habits into account, our aim is to make it easier for the viewer to select programs based on various individual viewing habits. Our desire, in fact, is to support even viewers that have no particular desire at the moment but would like to view something. To this end, we developed a TV navigation system that combines program recommendations, sorting, and retrieval. This system does not use the Internet; it operates on a standalone basis incorporated in a HDTV receiver. We held system trials with a focus on viewer evaluation and performed subjective evaluation tests. Here, with the aim of developing new evaluation methods as well, we also performed experiments on evaluating the impressions of general viewers and the extent to which they would like to use the system following their trials with the TV navigational equipment.

2. TV Viewing Habits and Program Selection

In Japan, the average TV viewing time is 3.5 hours per day, which has been the case since 1965. Viewing habits, on the other hand, have been changing gradually, and in 1985, a new trend began to take hold. Specifically, while viewers have always enjoyed the simultaneity and sense of presence that TV could offer, many of them were now turning on the TV set for only a vague reason at best and watching only things that interested them in a fragmentary manner. It has also been reported that recent viewing habits could be summarized as "viewing to pass the time" [7]. This is TV viewing with no objective as to content or information, or in other words, "to pass the time in a carefree and pleasant frame of mind." All in all, TV viewing habits can be categorized as follows.

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Table 1 Program selection methods

Methods	SI data	Profile data	TV navigation system operation	No.
Program retrieval	event name, text information (event descriptor)	None	Displays event names of all the broadcast programs, person names and place names included in the program description as candidate words. Retrieves programs with the word chosen by the viewer.	5-
Program sorting	content nibble level1, level2 (content descriptor), event name, text information	age, sex and preference mood / motivation	The viewer sorts one from all the programs using the timetable displayed in layers according to program classification. Selection from a specified interest area adapted to the viewer is also possible.	3,4
program recommen-dation			Programs adapted to the time zone and interest area are recommended. The viewer can also choose a program right for his or her prevalent mood (relaxing, informative, dramatic)	0,1

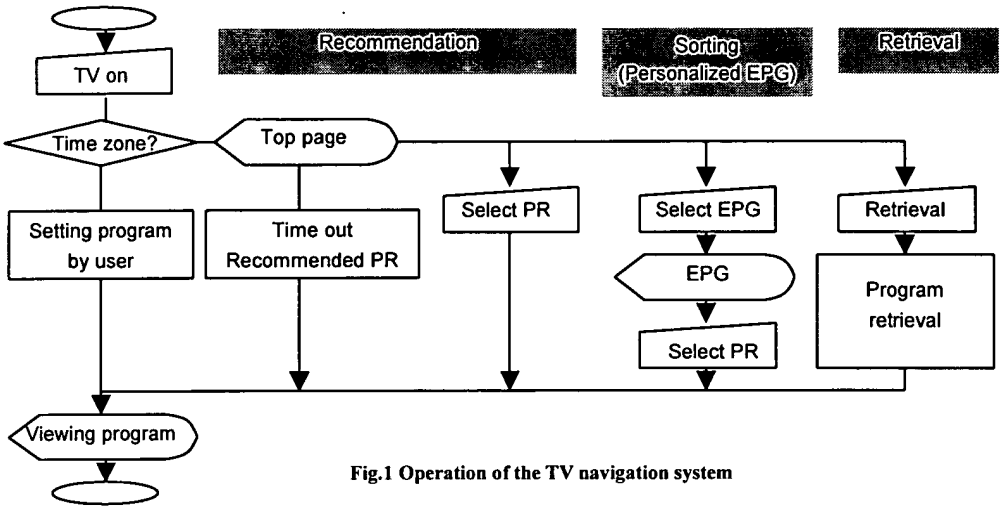

Fig.1 Operation of the TV navigation system

a. Concentrated viewing: The viewer focuses on the TV watching, for example, news or an educational program, or a movie or drama in a manner similar to watching a play at a theater.
b. Viewing TV while doing something else: The viewer watches typhoon reports while doing housework, watches news or live sporting events while eating, etc.
c. Diversion viewing: The viewer watches TV to kill time or to pass time in a carefree, relaxed mood.
d. Diversion viewing while doing something else: The viewer does housework or eats in a room where a TV that is normally on acts like a room clock.

Compared to habits (a) and (b), habits (c) and (d) can be treated as passive TV viewing. Such viewing habits are not fixed for any one viewer but change according to the time of day or viewer mood. A TV navigation system must be able to deal with any variety of viewing habits and with their tendency to change.

3. Concept of a TV Navigation System

The basic operation flow of our TV navigation system is shown in **Fig. 1**. The aim of this flow is to reduce the number of required operations for passive viewing habits and to deal appropriately with specific viewer interests. For example, a viewer that has just turned on the TV receiver can do nothing and simply watch the program currently showing on a certain channel if the time in question corresponds to a time zone in which the viewer always watches that channel. Alternatively, the viewer can sit back and watch a program recommended by the system. In addition, the viewer may elect to select a program. In this case, the viewer can do so from a list of recommendations or from an EPG that list several hours of programs from the present based on the viewer's personal profile. Finally, the viewer may also search for a program or programs related to a current topic of interest for up to one week into the future by specifying a program category and keywords. Program selection as described above can be divided into the following three types.

(1) Program retrieval: The viewer watches programs related to his or her interests if available.

(2) Program sorting as personalized EPG: The viewer selects and watches a program from among those that are currently being broadcast.

(3) Optimal program recommendation: The viewer watches a program recommended by the system as optimal or selects a program from those recommended as suitable for the way the viewer would like to pass the time.

Table 1 summarizes reference data, program selection algorithm, number of operations, and other information related to each of the above selection methods. The operation algorithm of the developed system is described next.

4. Development of a TV Navigation System

Fig. 2 shows the configuration of the TV navigation system that we have developed. The system assumes a TV set that can receive, decode, and display digital TV signals (DTV) on an HDTV display and that can be equipped with the TV navigation function. The TV navigation system first references a service information database (SIDB) storing TV broadcast schedules and profile data (PFD) storing viewer program preferences. Then, on the basis of this information, it selects programs that have a high probability of being liked by the viewer using a program retrieval/sorting engine and a recommendation engine, and presents selection results in table form on the display. The viewer can now decide on what program to watch from this table using interactive operations.

The DTV signal mentioned above includes content descriptions such as program titles, summaries, and categories as well as broadcast schedules as service information (SI) [8], [9]. One week of broadcast schedules from the present will be saved in the SIDB based on this SI. At the same time, the viewer's age, sex, and program preference will be implicitly and explicitly stored as PFD.

4.1 Program retrieval/sorting engine

The retrieval/sorting engine retrieves and sorts programs in accordance with the viewer's user profile and interests and displays the results as an EPG. The viewer selects a program to watch from those listed on the EPG.

In program retrieval, how best to go about inputting search keywords is a major issue. Given that whatever method is chosen will be incorporated in the TV receiver, various schemes have been considered for setting search keywords freely. These include voice recognition and a "soft keyboard" for inputting characters sequentially from a keyboard image displayed on the screen. A method of selecting a keyword from a set of keywords that have been broadcast and displayed on the screen has also been proposed, but this scheme requires a keyword production and transmission system. In contrast to the above, our TV navigation system extracts words from the text making up the program titles and descriptions in the EIT and displays those words as keyword candidates. From this display, the viewer selects those keywords that best suits his or her current interests and initiates a program search. Needless to say, this is not the same as being able to set keywords freely since those that can be chosen have been simply taken from program descriptions in broadcast schedules. One advantage of this approach, however, is that a program corresponding to the keywords in question has to exist. In addition, high-speed searches can be performed by using a database that stores correspondences between keywords and programs. **Fig. 3** shows the processing flow of program retrieval. For the system scale assumed here, three types of keyword candidates—persons' names, place names, and general nouns—are displayed and programs for a maximum of one week from the present are processed. At present, about 1960 persons' names, 590 place names, and 4510 general nouns can be extracted as keyword candidates from one week's worth of digital satellite broadcasts (76 channels) in Japan. This number of keywords could not, of course, be displayed on one screen at the time of program selection. The subjective evaluation tests described below were conducted with the number of keyword candidates kept to 100 or less by limiting the broadcast-schedule time period and the viewer's areas of interest.

Fig. 4 shows the processing flow of program sorting. In program sorting, the engine obtains the user profile, stores it in PFD, and updates that data on the basis of the viewer's operation history. In our TV navigation system the viewer sets first PFD with his or her attributes such as age, sex, area of residence, and occupation, and then combines this data with favorite program categories.

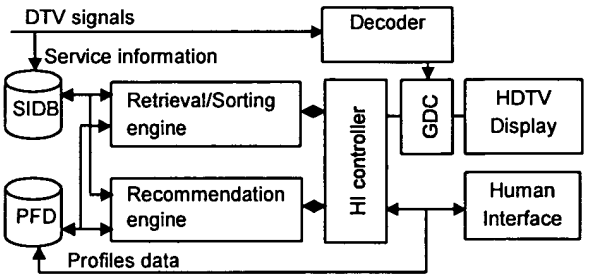

Fig.2 Configuration of the TV navigation system

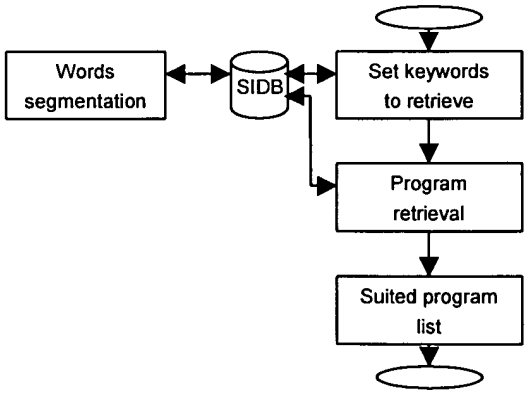

Fig.3 Flow chart for program retrieval

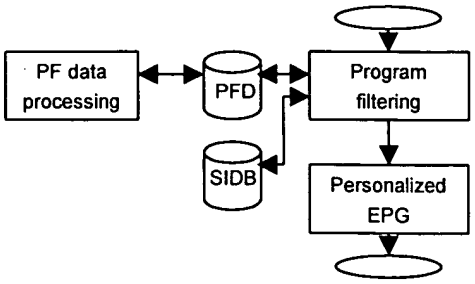

Fig.4 Flow chart for program sorting

Next, the PF data processing of the system computes the viewer's degree of interest with program classifiers called content nibble level1 and level2 set and then the data store in PFD. A viewer's PFD can change according to the time of day, and different PFDs can therefore be set for each time zone. In

the evaluation experiment described below, however, PFD remains constant throughout the day and the degree of interest can take on only two values, '1' or '0'. For the next version of our experimental system, our plan is to divide the day into six time periods and assign ten levels to the degree of interest. Now, in relation to program broadcast schedules stored in SIDB, the program filtering of the system compares the program classifiers included in the EIT with PFD as described above and creates a list of programs having a high possibility of being liked by the viewer (i.e., personalized EPG). In the current version of the system, the viewer selects a program using this personalized EPG, which lists programs beginning sometime over the next two hours.

4.2 Program recommendation engine

In program recommendation, the system presents the viewer with a suitable program even when the viewer does nothing at all after turning on the power to the TV set. In this regard, the recommendation engine can select one program that it thinks to be optimal for the viewer or can offer several candidates for the viewer to choose from. The program recommendation process handles programs that are currently being broadcast as well as programs that will be starting shortly. As mentioned above, however, it is not difficult to imagine how the types of programs one desires and even their method of selection might change according to the scenario in which one watches television within the course of a day. In the morning, for example, a viewer might want to check out the news and the weather report for that day, while in the evening, when relaxing after dinner, the same viewer might like to watch a more dramatic or entertaining program such as a movie, drama, or live sports event. **Table 2** shows an example of how personal preferences change according to time of day in terms of three program attributes: relaxing, informative, and dramatic. **Fig. 5** shows the processing flow of the program recommendation engine. The program recommendation engine first determines the characteristics of each program that is currently being broadcast or soon to be broadcast by assigning a value to each of the above attributes based on program classification. It then adds a weight based on viewer preferences how to spend time. And computes an index value for recommendation indicating the degree to which the viewer would like to view that program in that time period as follows:

$$IVR = \sum_{i=1}^{3} PR(i)Fi(t) \qquad (1)$$

IVR: Index value for recommendation
PR(i): Program characteristics of the ith attribute
Fi(t): Personalized weighting factor
i: Program attribute (relaxing, informative, and dramatic)
t: Time zone

The program with the highest index is recommended by the system. At this time, the system can also present a list of several programs with high index values so that the viewer can select a program from that list if so desired.

5. Subjective Evaluation Tests

We examined the impressions of people that tried using our experimental TV navigation system. Our aim here was to make a basic comparison of the program selection methods including "program recommendation" as implemented by the system. These subjective evaluation tests are summarized below.

A. Evaluation method

To evaluate the impressions of people that used the TV navigation system and performed program-selection operations, we employed the 24 pairs of adjectives and adverbs listed in **Table 3** and had subjects evaluate each pair on a 5-level basis. Subjects were also asked to specify the extent to which they would say "I would like to use this" with 100 points being a perfect score.

B. Subjects

There were a total of 30 subjects divided into two groups of 15 with subject age in the first group ranging from 20 to 30 years old and that in the second group from 65 and up. The male/female ratio was about 50/50.

C. Viewing conditions

We adopted standard viewing conditions as used in ITU-R TV-quality evaluations[10] and a 30-inch liquid-crystal HDTV display with viewing distance set to 4H.

Table 2 Examples for personal weighting factor

Time zone		morning	afternoon	evening	night
How to	relaxing	20	50	30	60
spend	informative	70	30	20	20
time?	dramatic	10	20	50	20

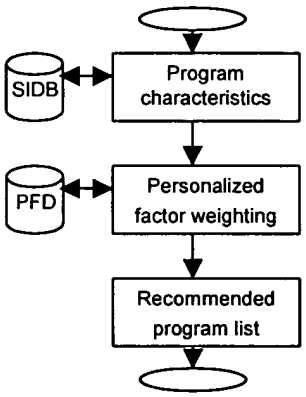

Fig.5 Flow chart for program recommendation

D. Test parameters

Subjects were asked to evaluate six different cases combining the following program-selection procedures (the > mark indicates the initial screen) and viewing scenes.

Selection procedures 1: > Sorting, retrieval
2: > Recommendation
3: > Recommendation, sorting, retrieval

Scenes a: Morning (for example, when having breakfast and planning to go out soon afterwards)
b: Evening (for example, when relaxing after having dinner)

The order of presenting the above selection procedures to each subject was random while that of the scenes alternated between "a then b" and "b then a".

E. Contents

Two series of the experimental contents were made for interactive operation of our TV navigation system. **Fig. 6** shows the initial screen of experimental content used in the subjective evaluation tests.

F. Test Procedures

The subjective evaluation tests were performed under the above conditions from January 10 to 27, 2003. They were carried out separately for each subject over seven sessions. In each of the first six sessions, a subject was asked to try using the system for one of the six combinations 1a-3b of procedures and scenes with usage time limited to 15 minutes. The subject was then asked to evaluate that selection method by specifying one of five levels for each of the 24 sets of adjectives/adverbs in **Table 3**, i.e., by indicating which side of each adjective/adverb set was most applicable to that selection method. Here, to obtain a wide evaluation of user impressions, we used a broad range of adjectives and adverbs. Furthermore, to lighten the psychological load on the subjects, we asked them in our pre-test instructions to "evaluate each selection method intuitively without giving it too much thought." After the above evaluation, the subject was asked to make a note for future reference as to what extent they would say "I would like to use this" for that selection method on a scale from 0 to 100. Finally, in the seventh session, the subject was asked to recollect his or her use of the TV navigation system in the prior six sessions and to give a general evaluation of each selection method in terms of "I would like to use this" again with 100 points being the top score. Because each of the above operation methods had many common elements, the time needed for each trial decreased gradually for many subjects. In these tests, instead of simply presenting the TV program that had been selected, both the selected program and a still screen indicating the name of the program were displayed in an overlaid manner.

6. Results and Desiccations

6.1 General evaluation

Subjects were asked to make a general evaluation of all six selection methods 1a-3b after being given the following instruction:

"Assuming that a TV receiver having these types of program-selection methods was installed in your home, and that you would use the three selection methods that you were earlier shown under the two scenes stated, please evaluate each selection method in terms of 'I would like to use this' with 100 points being the highest score."

Fig.6 An example of display information

Table 3 Adjective Pair for Evaluation Testing

No	Adjective Pair
1	Easy to use - difficult to use
2	Easy to select - difficult to select
3	Organized - disordered
4	Clear - unclear
5	Easy to understand - difficult to understand
6	Easy to get used to - difficult to get used to
7	Easy to see - difficult to see
8	Simple - complex
9	Calming - irritating
10	Streamlined - excessive
11	Easy - difficult
12	Relaxed - rushed
13	Quick - slow
14	Novel - outdated
15	Cool - unsightly
16	Happy - sad
17	Interesting - dull
18	Enjoyable - boring
19	Warm - cold
20	Rich - poor
21	Free - restricted
22	Light - heavy
23	Cheerful - gloomy
24	Elegant - crude

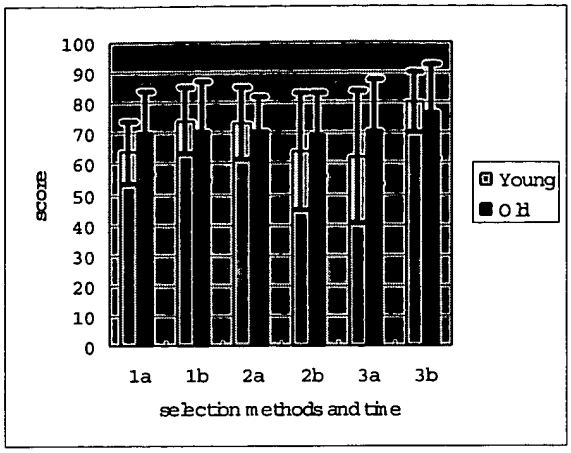

Fig.7 Result of general evaluation

Fig. 7 shows average values and standard deviation of the evaluation results. Standard deviation ranged from 10 to 16 points, and the following characteristics could be observed even if a significant difference could not be said to exist.

(1) On comparing in terms of scenes for using the TV navigation system, watching in the morning was found to have a high evaluation for selection procedure 2 while watching in the evening had a high evaluation for selection procedures 1 and 3.

(2) For the younger age group, a difference of 10 or more evaluation points could be seen between morning and evening, and for the older age group, that difference was small.

(3) Selection procedure No. 2 (recommend) received a high evaluation in the morning while selection procedure No. 3 (the combination of recommend, sort, and retrieve) received a high evaluation in the evening.

We can interpret the above findings as saying that program recommendation as a guidance method of a TV navigation system is useful for a younger age group in the morning, a busy time in the day for such viewers. They also indicate that the combination of sorting and retrieval is useful for an older age group at any time of day.

6.2 Evaluation of subject impressions

To clarify from what points of view the TV navigation system was evaluated, we performed a principal component analysis on the evaluation by impressions for all subjects across sessions 1 to 6 with respect to the 24 adjective and adverb pairs in **Table 3**. **Table 4** shows the top three principal components in terms of contribution rate and eigen coefficients as determined by this analysis. The contribution rate of the first principal component is 40.2 %, that of the second one is 15.0 % and that of the third one is 5.3 % for a total of 60.5%.

Table 4 Contribution rate and eigen coefficients of principal component analysis (All data)

1st principal component "Efficient"	40.2%	2nd principal component "Richness & pleasure"	15.0%	3rd principal component "Carefree"	5.3%
Simple	0.283	Rich	0.408	Relaxed	0.306
Streamlined	0.268	Free	0.307	Easy	0.281
Easy to select	0.263	Enjoyable	0.269	Cheerful	0.258
Easy to understand	0.260	Interesting	0.264	Simple	0.248
Organized	0.252	Cheerful	0.218	Organized	0.239
Easy to use	0.250	Warm	0.212	Warm	0.238
Quick	0.246	Novel	0.204	Calming	0.238
Clear	0.240	Happy	0.192	Clear	0.096
Easy to get used to	0.234	Cool	0.189	Enjoyable	0.077
Easy	0.209	Relaxed	0.147	Elegant	0.040
Calming	0.198	Elegant	0.128	Cool	0.026
Easy to see	0.194	Calming	0.103	Happy	0.012
Free	0.191	Light	0.057	Easy to get used to	0.010
Interesting	0.187	Easy to get used to	0.013	Light	-0.007
Light	0.184	Easy to see	0.004	Easy to see	-0.051
Enjoyable	0.179	Easy to select	-0.005	Interesting	-0.056
Happy	0.174	Easy	-0.135	Easy to understand	-0.075
Cheerful	0.167	Clear	-0.146	Easy to use	-0.119
Relaxed	0.158	Organized	-0.178	Novel	-0.124
Elegant	0.144	Easy to use	-0.182	Rich	-0.166
Warm	0.131	Streamlined	-0.183	Quick	-0.170
Novel	0.120	Quick	-0.231	Free	-0.264
Cool	0.110	Easy to understand	-0.258	Streamlined	-0.342
Rich	0.082	Simple	-0.285	Easy to select	-0.476

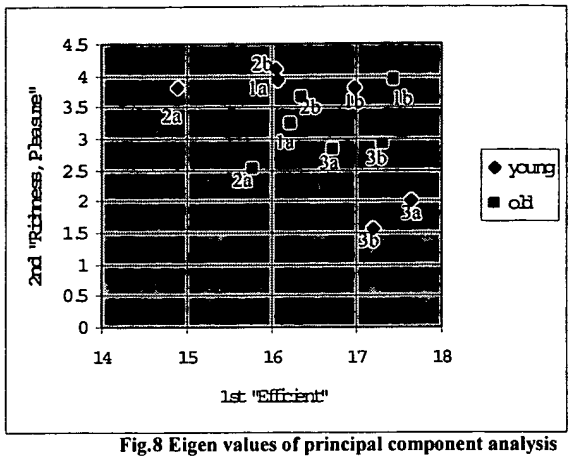

Fig.8 Eigen values of principal component analysis

From the major adjectives and adjective verbs, the first principal component is understood as "efficient" in use such as in simple, streamlined, easy to select, easy to understand, organized, and easy to use. The second principal component can be interpreted as "richness and pleasure" as in rich, free, enjoyable, and interesting, while the third principal component can be interpreted as "carefree" as in relaxed, easy and cheerful.

On performing a principal component analysis on both the younger age group and older age group of subjects, no large difference was observed between the two for the first and second principal components. For the third principal component, however, a difference appears. In the younger age group, this component can be interpreted as "cheerfulness" as in cheerful, organized, and easy, and in the older age group, as "originality" as in novel, interesting, and free. In future research, we plan to conduct more detailed analyses such as by analyzing principal component scores for each selection procedure.

Based on the results of principal component analysis on the evaluation by impressions, **Fig. 8** shows average values of principal component eigen values for "efficient," the first principal component, and "richness and pleasure," the second principal component, over all sessions. Given that these results are based on the evaluation by impressions, we obtained high evaluations for selection methods 3a, 3b, and 1b, which reflects about the same characteristics as the results for the general evaluation described earlier. The evaluation of the younger-age group shows the result that 3a and 3b corresponding to the three selection methods are efficient and 1a and 1b corresponding to sorting and retrieval is pleasurable.

Our plan is to use the above results in deciding how to improve the program retrieval/sorting and recommendation engines and to upgrade the TV navigation system.

7. CONCLUSION

This paper has described our development of a TV navigation system that helps viewers select programs broadcast by digital television. This system can recommend programs that suit viewer preferences, present an electronic program guide for program selection based on viewer preferences, and perform program retrievals based on viewer desires. Subjective evaluation tests were performed using this system and results revealed that program recommendation received high marks from both young and elderly subjects. In future research, we plan to carry out more detailed analyses on actual SI operation and viewer preferences with the aim of improving the program retrieval/sorting and recommendation engines of this TV navigation system. We also aim to introduce a human interface that can support a wide range of viewers as a "universal design" and to achieve a TV navigation system personalized for each major age group. We will likewise perform more viewer-based evaluation tests and establish new evaluation methods to meet the demand for easy-to-use TV navigation systems.

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Group modeling: Selecting a sequence of television items to suit a group of viewers

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Abstract. Watching television tends to be a social activity. So, adaptive television needs to adapt to *groups* of users rather than to *individual* users. In this paper, we discuss different strategies for combining individual user models to adapt to groups, some of which are inspired by Social Choice Theory. In a first experiment, we explore how *humans* select a sequence of items for a group to watch, based on data about the individuals' preferences. The results show that humans use some of the strategies such as the Average Strategy (a.k.a. Additive Utilitarian), the Average Without Misery Strategy and the Least Misery Strategy, and care about fairness and avoiding individual misery. In a second experiment, we investigate how satisfied people believe they would be with sequences chosen by different strategies, and how their satisfaction corresponds with that predicted by a number of satisfaction functions. The results show that subjects use normalization, deduct misery, and use the ratings in a non-linear way. One of the satisfaction functions produced reasonable, though not completely correct predictions. According to our subjects, the sequences produced by five strategies give satisfaction to all individuals in the group. The results also show that subjects put more emphasis than expected on showing the best rated item to each individual (at a cost of misery for another individual), and that the ratings of the first and last items in the sequence are especially important. In a final experiment, we explore the influence viewing an item can have on the ratings of other items. This is important for deciding the order in which to present items. The results show an effect of both mood and topical relatedness.

Keywords Group modeling, interactive television, social choice, adaptation, recommender

1 Introduction

Interactive television offers the possibility of personalized viewing experiences. Different domains have been identified in which this personalization would have a great impact, such as education (Masthoff & Luckin, 2002), news (Maybury, 2001), advertising (Lekakos, Papakiriakopoulos & Chorianopoulos, 2001), and electronic program guides (Cotter & Smyth, 2000). Adapting television to *individual* viewers is a topic in itself, and a lot of research has already been done, particularly in the area of electronic program guides. This research tends to build on decades of work on content-based and social filtering. In this paper, we will explore an even more difficult issue: adaptation to a *group* of viewers. We believe this to be essential for interactive television as, in contrast to the use of PCs, television viewing is largely a family or social activity (Barwise & Ehrenberg, 1988; Kasari & Nurmi, 1992). Unfortunately, television-viewing statistics do not include data on the average number of people watching television together and who watches television with whom (as also noted by Gillard, 1999). It is very likely to be culturally dependent, as the number of televisions per household varies widely. According to a large research study in the UK (Livingstone & Bovill, 1999), television is the medium most often shared with family. Watching television together is top of the list of activities shared between parents and children, and more than two thirds of children watch their favorite programme with somebody else, nearly always family. Children most often watch with their siblings (Van Evra, 1998). Young people would like to watch television with friends, though (due to a lack of resource) many do not manage to do so (Livingstone & Bovill, 1999). Given the rising number of televisions in bedrooms it is likely that watching television with friends will be an increasingly popular activity. Already, television is the most popular conversation topic of young people with friends (Livingstone & Bovill, 1999). For these reasons, we believe that adaptive television should be able to *adapt to groups of people* watching together. These groups can be quite heterogeneous, and age, gender, intelligence, and personality influence what types of TV programmes people enjoy (Kotler, Wright & Huston, 2001; Gillard, 1999; Livingstone & Bovill,1999). The question then arises how one can adapt to a

group of viewers, in such a way that each individual enjoys (and in educational programs, benefits from) the broadcast.

2 Strategies for combining user models

User modeling has been widely studied, particularly the modeling of user preferences (directly or indirectly via observation and inference) (see UMUAI journal, User Modeling conferences). In contrast, *group modeling* – combining individual user models to model a group– has hardly been investigated in our field. There are only three main adaptive systems that use it: MUSICFX (McCarty & Anagnost, 1998), POLYLENS (O' Conner, Cosley, Konstan & Riedl, 2001), and INTRIGUE (Ardissono, Goy, Petrone, Segnan, & Torasso, 2002). MUSICFX is used in a company's fitness center to select background music to suit a group of people working out at any given time. POLYLENS is a group recommender extension of MOVIELENS, which recommends movies based on an individual's taste as inferred from ratings and social filtering. It allows users to create groups and ask for a recommendation for that group. INTRIGUE recommends places to visit for tourist groups taking into account characteristics of subgroups within that group (such as children and disabled). Though some exploratory evaluation of MUSICFX and POLYLENS has taken place, for none of these systems it has been investigated how effective their group modeling strategies really are, and what the effect would be of using a different strategy. Besides, the application domains of both POLYLENS and MUSICFX differ from television viewing in the sense that these systems do not need to select a group of items: people normally only see one movie per evening, and music stations can play forever[1]. For INTRIGUE, on the other hand, it is quite likely that a tourist group would visit multiple attractions during their trip, but the selection of a balanced sequence has not been addressed yet. Our view on adaptive interactive television is that reasonably *small* video segments would be concatenated. The smaller the segments the more adaptation and real interactivity can take place.

Though group modeling has hardly been studied in our field, the related issue of *social choice* (also called group decision making) –deciding what is best for a group given the opinions of individuals– has been studied extensively in economics, politics, sociology, and mathematics (see, e.g. Condorcet, 1785; Pattanaik, 1971; Taylor, 1995). Their construction of a *social welfare function* is very similar to our group modeling problem. Other areas in which the problem has been studied are Meta-Search, Database Middleware, Collaborative Filtering, and Multi-Agent systems. In Meta-Search, the ranking lists produced by multiple search engines need to be combined into one list (they call this the problem of rank aggregation). See, for instance, Dwork, Kumar, Naor, Sivakumar (2001), and Cohen, Schapire, and Singer (1999). Dwork et al. base their work on social choice theory, and use a variant of the method of Kemeny, which uses an extended Condorcet principle (see Section 2.2 for an explanation of the ordinary Condorcet principle, and why we object to it). In Database Middleware, objects have to be ordered where each object has numerical values for multiple fields (see for instance, Fagin, Lotem, and Naor, forthcoming). In Collaborative Filtering, preferences of a group of individuals have to be aggregated to produce a predicted preference for somebody outside the group. See Pennock, Horvitz and Giles (2000) for an explanation of how social choice theory applies to collaborative filtering. In multi-agent systems, agents need to take decisions that are not only rational from an individual's point of view, but also from a social point of view. See Hogg and Jennings (1999) for a discussion of social rationality for agents and its links to Social Choice Theory. See Ephrati and Rosenschein, (1996) for how a social decision mechanism (namely the Clarke Tax mechanism) can be used to reach consensus between multiple non-cooperative (possibly cheating) agents.

In this section, we will discuss some of the issues, and present a number of example strategies.

2.1 Focusing our problem and introducing an example

Assume the television has a set of items to choose from. These can be news items, quiz questions, MTV music clips, television programs, etc. For our discussion we will just call them items (and video clips in the experiments). Assume the television needs to adapt to a group of viewers. Assume the television knows who the viewers are, and the system has preference ratings for each of them (say from 10, really like, to 1, really hate).

[1] This would have been different if MUSICFX selected individual songs rather than radio stations.

The problem now is which items should the television show, given that it has time for a certain number but not all of them?

An example of this situation is given below. There are three viewers, John, Adam and Mary, and the television has ten items to select from (A to J). For each item, it knows the preference ratings, for instance, John really likes A, but Adam really hates it. The problem is what should the TV show if it has time for only one item? What if it has time for two items? Etc.

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6

This example will be used to illustrate the strategies described below, and will also be used in the experiments presented in Sections 3 and 4.

Note that we have made a number of simplifications: we have assumed that a number of problems have been solved while actually they are still a focus of much research. For example:

- *How will the television know who is watching it?* Solutions have been proposed in the form of an individual infrared card which registers viewers automatically (Lieberman, van Dyke, & Vivacqua, 1999), an individual token which you have to put on the television, a login procedure (which can take a conversational form, with the television asking who is watching it tonight), and a probabilistic mechanism using the time of day combined with a known probability of a viewer watching at that time (Goren-Bar & Glinansky, 2002).
- *How will the preferences of the individual users be determined?* Social, and content-based filtering can be used, combined with stereotypes (see many papers in Ardissono & Buczak, 2002). Obviously, there is a complication in that it is difficult to make inferences from actions when a group watches the television, but actions at times the user watches alone could be used combined with a probabilistic model when watching in company. Plua and Jameson (2002) describe a mechanism by which groups of people who know each other well can help each other to specify their preferences. An additional complication is that an individual's ratings might depend on the group they are in. For instance, a teenager might be very happy to watch a programme with his younger siblings, but might not want to see it when with his friends.
- *Dealing with differences in rating tendencies.* Not all people have the same rating behavior. Some people only use the ends of the scale, they either "really hate" or "really love" an item. Others only use the middle, never being very positive, and never being really negative. A "7" by Pete, who is always very negative, may be a far more positive review than a "9" by Tim, who likes everything. Note that similar differences may occur when ratings are inferred from viewing behavior. These differences in behavior should be taken into account when using ratings as input for a group model. One way to do this is to normalize them. Though we have not assumed the ratings of John, Adam and Mary to be completely comparable (and indeed some differences in rating tendencies can be seen in the example, e.g. between John and Adam), we have simplified our problem by giving all individuals "reasonable" rating behaviors. For instance, none of them only uses the ends of the scale.
- *Dealing with uncertainty.* The preferences as determined by filtering mechanisms do not have to be correct (though accuracy is growing). For the research in this paper, we will assume the ratings to be accurate. We will revisit this issue in the Areas for Further Work section in the conclusions.
- *Changing groups.* We assume that the group remains the same during the whole sequence. If one member of the group needs to leave early (a child, for instance, who has to go to bed) then it is likely that the preferences of that person should have greater weight when they are present.
- *Dealing with multidimensionality.* Often, you have ratings in multiple dimensions, rather than just one dimension. For instance, in adaptive instruction, there are many reasons for selecting an item, such as the student's existing knowledge (does it fulfill the prerequisites), learning goal and learning style, the educational flow (does it built on what has been explained before), etc. One way to match this onto the modeling as discussed above would be to construct a single rating for each item based on how it scores on these criteria. Masthoff (in press) describes a way in which the aggregation methods discussed in this paper can be used to aggregate ratings of different criteria.
- *How will the recommendations be presented to the group?* We assume that the television decides which items to show, so, does not give the viewers a choice. One kind of application we are considering is a personalized news program. So, instead of watching a news broadcast that is the same for all viewers (like the BBC

news), you would watch a news program with items in it that are automatically selected for the group of people you are watching with. Most recommender systems, in contrast, would present their list of recommendations to the user, and different ways have been devised on how to do this. For instance, Zimmerman, Parameswaran, and Kurapati (2002) discuss using celebrities (a photo combined with text) to present generated content recommendations (for instance, for an Electronic Program Guide).

All of these problems merit more research, but are beyond the scope of this paper.

2.2 Desirable properties

In Social Choice Theory, some consensus exists about desirable properties of voting systems, but it has been proven that no system can have all these properties (Arrow, 1950), and, arguably, this is why different voting systems exist in different countries, institutions, and societies (see Cranor, 1996, for about 20 of these, and Section 2.3 for a selection). One analysis of 27 democracies over a period of 45 years found a staggering 70 different voting systems being used for national elections (Lijphart, 1994).
Some examples of desirable properties that have been proposed:

- *Pareto rule* (Pareto, 1897).
  If at least one person prefers x to y and nobody prefers y to x, then x should be above y in the ranking. If nobody prefers x to y and nobody prefers y to x, then x and y should share a place in the ranking.
  In our example, everybody prefers F to G. Hence, F should precede G in the group list. Similarly, F should precede H, as John and Mary prefer it and Adam does not mind.
  In this manner, we find:

B should precede C	D should precede B,C,G	E should precede G,I
F should precede B,C,D,G,H,J	H should precede B,C,G,J	J should precede C,G

- *Anonymity* (May, 1952).
  If the ratings of two individuals are swapped for all alternatives, then the resulting sequence should remain the same. Note that dictatorship violates this rule, and that it can be well defended that in real life television viewing not everybody has to have equal rights all the time. For instance, if it is John's birthday than maybe it is fair to give John more satisfaction on that day than the others.
- *Positive Association.* (Arrow, 1951).
  If alternative x preceded alternative y in the sequence, then an increase in an individual's rating of x should maintain x's position before y in the sequence.
  If alternative x appeared equal to alternative y in the sequence, then an increase in an individual's rating of x should lead to x being before or equal to y in the sequence. Note that it is tempting to say that x should precede y in the latter case, but this is too strong a condition. For instance, if the sequence was determined on the basis of Plurality Voting (see below), then x and y could be equal because as many people preferred x to y as preferred y to x. Increasing the rating of x for one individual does not necessarily change this.
- *Condorcet winner criterion* (Condorcet, 1785).
  An alternative x is a Condorcet winner if for each other alternative y:
  x is preferred to y by the majority of individuals.
  The criterion states that if a Condorcet winner exists then it should *top the group list on its own.*
  A weaker version allows it to *share* the top of the group list.
  The criterion becomes stronger when modifying the Condorcet winner definition to
  "x is preferred *or equal* to y by the majority of individuals."
  In our example, both E and A are Condorcet winners using this definition.
  We do not agree with this criterion (not even in its weakest form). Assume an item x is rated 10, 1, 10 (as A is in our example). Assume all other items are rated 9, 9, 9. Item x is then a Condorcet winner, but it can be argued that it should not top the group list, given the misery it produces for the second individual.

Our resistance to the Condorcet winner criterion highlights another property we might want our voting systems to have:

- *Each individual's satisfaction with the results should be above a certain threshold.*
  When a sequence of items is selected for a group to watch, the individual's satisfaction could be measured at the end of the sequence, or, in a stronger version of this rule, at any moment in the sequence. Note that the latter does not necessarily mean that the individual's satisfaction with each item should be above a certain threshold, as satisfaction is considered in the *context* of the items shown so far. For instance, consider a sequence "8 9 3 10". If we want to measure satisfaction at any moment in the sequence, then we would

have to measure the satisfaction after having seen "8", after having seen "8 9", "8 9 3", and "8 9 3 10". The satisfaction of the individual after having seen "8 9 3" could well be higher than the satisfaction with "3" on its own, so this sequence might pass this criterion, while a sequence "3 8 9 10" might fail.

We will need to determine empirically whether typical TV viewers share our negative feelings about the Condorcet winner criterion, and whether they agree with our individual satisfaction rule.

2.3 Example strategies

Many strategies, also called "social choice rules", "group decision rules", and "rank aggregation functions", have been devised for reaching group decisions given individual opinions. We will discuss some simple ones (the first five originate from social choice theory and the latter five from our specific use), and illustrate them with the example introduced above. The example will show the 'group list' resulting from the strategy, a sequence indicating in which order the items would be chosen. Sometimes, two items score the same, like E and F in the Additive Utilitarian strategy. That is indicated in the group list by placing them between brackets. This means that either E is followed by F, or F followed by E. The main purpose of this section is to show that many different, all seemingly logical, strategies can be devised, all of which have quite distinct results when applying them to the example.

1. *Plurality Voting* (also called 'first past the post'). Each voter votes for his or her most preferred alternative. The alternative with the most votes wins. This method is, for instance, used in UK elections. When a sequence of alternatives needs to be selected, this method can be used repetitively: first, an election is held for the first place in the sequence, next for the second place, etc. In the example, John would like to vote for A, E, or I (all ratings of 10). Adam for B, D, F, or H, and Mary for A. Traditionally in Plurality voting, each individual has only one vote, so, John would have to decide whether to vote for A, E, or I. If John were aware of the preferences of the others, then it is likely that he would vote for A, as with Mary's vote this would secure a majority. In our scenario, with only three individuals and ten items, it is quite likely that a vote would end in a tie (in contrast to politics, where the number of individuals tends to be a lot larger than the number of alternatives). If John were to vote for E or I, then all three individuals would vote for a different item, and there would be no winner. It would clearly be in John's interest to vote A. In our case, the television would decide on a choice for the group, and as the television would be aware of all individuals' preferences, it could easily accommodate strategic voting, to prevent ties. Our interpretation of Plurality Voting in this context will therefore be that rather than giving individuals one vote, we allow them to vote for all items that have the highest rating. In our example, this gives A two votes, and it becomes the start of the sequence. Next, John likes to vote for E or I, Adam for B, D, F, or H and Mary for E. With two votes E has most votes, and becomes second in the sequence.

	1	2	3	4	6	7	8	10
John	A,E,I	E,I	I	I	H,J	J	G	C
Adam	B,D,F,H	B,D,F,H	B,D,F,H	B,D,H	B,H	B	B	C
Mary	A	E	F	D,I	H,J	J	B,G	C
Group	A	E	F	D,I	H	J	B,G	C

Group List:
AEF(I,D)HJ(B,G)C

Instead of using the method repetitively, each voter could vote for x alternatives (with x being the length of the sequence).

	1	2	3	4	5	6	7	8
John	AEI			AEIF	AEIFHJ		AEIFHJDG	
Adam	BDFH				BDFHJC		BDFHJCE	BDFHJCEG
Mary	A	AE	AEF	AEFDI		AEFDIHJ		AEFDIHJBG
Group	A	AE	AEF	F(AEDI)	F(AEDIHJ)	FHJ(AEDI)	FHJED(AI)	FHJEDG(AIB)

2. *Utilitarian Strategy.* Utility values for each alternative (expressing the expected happiness) are used, instead of just using ranking information (as in plurality voting). This can be done in multiple ways:
Additive. Ratings are added, and the larger the sum the earlier the alternative appears in the sequence. Note that the resulting group list will be exactly the same as when taking the average of individual ratings. For this reason this strategy was called the "Average strategy" in (Masthoff, 2002). This strategy (often in a weighted

form, where weights are attached to individual ratings) is used in multi-agent systems (Hogg & Jennings, 1999) and Collaborative filtering. This is also the strategy used in the INTRIGUE system (Ardissono et al, 2002), with a weighting depending on the number of people in the subgroup and the subgroup's relevance (children and disabled had a higher relevance).

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	21	18	13	22	26	26	17	23	20	22

Group List:
(E, F) H (D, J) A I B G C

Multiplicative. Instead of *adding* the utilities, they are multiplied, and the larger the product the earlier the alternative appears in the sequence.

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	100	180	48	378	630	648	180	432	210	384

Group List:
F E H J D I (B, G) A C

A disadvantage of the utilitarian strategy is that an individual viewer might always lose out, because their opinion happens to be a minority view. This is more likely to cause problems the larger the group. After all, in a small group the opinion of each individual will have a large impact on the average/product.

3. *Borda Count* (Borda, 1781). Points are awarded to each alternative according to its position in the individual's preference list: the alternative at the bottom of the list gets zero points, the next one up one point, etc. For instance, in our example John has the lowest rating for C, and hence, C is awarded 0 points. A problem arises when an individual has multiple alternatives with the same rating. We have decided to distribute the points. So, for example, in Mary's list B and G share the place one up from the bottom and get (1+2)/2 = 1 1/2 points each. To obtain the group preference ordering, the points awarded for the individuals are added up.

	A	B	C	D	E	F	G	H	I	J
John	8	1	0	2 ½	8	6	2 ½	4 ½	8	4 ½
Adam	0	7 ½	4 ½	7 ½	3	7 ½	2	7 ½	1	4 ½
Mary	9	1½	0	5½	8	7	1½	3½	5½	3½
Group	17	10	4½	15½	19	20½	6	15½	14½	12½

Group List:
F E A (H, D) I J B G C

4. *Copeland Rule* (Copeland, 1951). This is a form of majority voting. It orders the alternatives according to the Copeland index: the number of times an alternative beats other alternatives minus the number of times it loses to other alternatives. For instance, in the example A beats B as both John and Mary prefer it.

	A	B	C	D	E	F	G	H	I	J
A	0	-	-	-	0	-	-	-	0	-
B	+	0	-	+	+	+	0	+	+	+
C	+	+	0	+	+	+	+	+	+	+
D	+	-	-	0	+	+	-	0	0	-
E	0	-	-	-	0	-	-	-	-	-
F	+	-	-	-	+	0	-	-	-	-
G	+	0	-	+	+	+	0	+	+	+
H	+	-	-	0	+	+	-	0	+	-
I	0	-	-	0	+	+	-	-	0	-
J	+	-	-	+	+	+	-	+	+	0
Index	+7	-6	-9	+1	+8	+5	-6	0	+3	-3

Group List:
E A F I D H J (B, G) C

Note that in the example the resulting group list is almost identical to the one resulting from repetitive plurality voting.

5. *Approval Voting.* Voters are allowed to vote for as many alternatives as they wish. This is intended to promote the election of moderate alternatives: alternatives that are not strongly disliked. This type of voting is used by several professional societies, like the IEEE. In our example, we could assume that John, Mary, and Adam vote for all alternatives with a rating above a certain threshold. They could vote for all alternatives with a rating higher than 5, as this means voting for all alternatives they like at least a little bit.

Threshold 5.

	A	B	C	D	E	F	G	H	I	J
John	1			1	1	1	1	1	1	1
Adam		1	1	1	1	1	1	1		1
Mary	1			1	1	1		1	1	1
Group	2	1	1	3	3	3	2	3	2	3

Group List:
(D, E, F, H, J) (G, A, I) (B, C)

Threshold 6.

	A	B	C	D	E	F	G	H	I	J
John	1				1	1		1	1	1
Adam		1	1	1	1	1		1		1
Mary	1			1	1	1			1	
Group	2	1	1	2	3	3	0	2	2	2

Group List:
(E, F) (A, D, H, I, J) (B, C) G

6. *Least Misery Strategy.* Make a new list of ratings with the minimum of the individual ratings. Items get selected based on their rating on that list, the higher the sooner. The idea behind this strategy is that a group is as happy as its least happy member. POLYLENS (O' Conner, Cosley, Konstan & Riedl, 2001) uses this strategy, assuming groups of people going to watch a movie together tend to be small and a small group to be as happy as its least happy member. A disadvantage is that a minority opinion can dictate the group: if everybody really wants to see something, but one person does not like it, then it will never be seen.

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	1	4	2	6	7	8	5	6	3	6

Group List:
F, E, (H, J, D), G, B, I, C, A

7. *Most Pleasure Strategy.* Make a new list of ratings with the maximum of the individual ratings. Items get selected based on their rating on that list, the higher the sooner.

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	10	9	8	9	10	9	6	9	10	8

Group List:
(A, E, I), (B, D, F, H), (C, J), G

8. *Average Without Misery Strategy.* Make a new list of ratings with the average of the individual ratings, but without items that score below a certain threshold (say 4) for individuals.

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	-	18	-	22	26	26	17	23	-	22

Group List:
(E, F), H, (D, J), B, G (threshold 4)
(E, F), H, (D, J), I, B (threshold 3)

MUSICFX (McCarty & Anagnost, 1998) uses a more complex version of this strategy. Their users rate all music stations, from +2 (really love this music) to -2 (really hate this music). These ratings are converted to positive numbers (by adding 2) and then squared to widen the gap between popular and less popular stations. An Average Without Misery strategy is used to generate a group list. To avoid starvation and always picking the same station, a weighted random selection is made from the top m stations of the list (m being a system parameter).

9. *Fairness Strategy.* Top items from all individuals are selected. When items are rated equally, the others' opinions are taken into account. The idea behind this strategy is that it is not so bad to watch something you hate, as long as you get to watch the things you really love as well. This strategy is often applied when people try to fairly divide a set of items: one person chooses first, then another, till everybody has made one choice. Next, everybody chooses a second item, often starting with the person who had to choose last on the previous round. It continues till all items have been used. In our example, if we assume John chooses first, then John would like A, E, or I. He could choose E because it causes the least misery to others and has the highest average. Next it is Adam's turn. Adam would like B, D, F, or H. He could choose F because it has the best ratings for the others. Mary would choose A (her highest rating). Next, Mary would like E, which has already

been shown, and then F, which also has already been shown. Therefore, it makes sense to let Adam choose. He likes B, D, or H. He chooses H, as that has the best ratings for the others. Following this strategy, we could end up with a group list like: E, F, A, H, I, D, B, etc. The list would, of course, be different if we let Mary or Adam choose first. However, we would expect A to be within the first three items, as it is the item Mary prefers most.

10. *Most Respected Person Strategy (Also called "Dictatorship").* The ratings of the most respected person are used --in our example assume that is Adam--, only taking the ratings of the others into account to choose between similarly rated items. The idea behind this strategy is that groups may be dominated by one person. For instance, some research shows that the television remote control is most often operated by the oldest male present. Similarly, adults may have more influence than children (could depend on the time of day, adults having more influence later in the day). Visitors may have more influence than inhabitants of the house. Special circumstances, like birthdays, illness, etc. can influence who is "the most respected" person on a particular moment. This strategy is used often in collaborative filtering under the name of "the nearest neighbor strategy": only the preferences of the individual closest in taste to the outsider are used.
A more sophisticated use of differences in social status would be to assign weights to the individuals' ratings. As mentioned above, this has also been used in collaborative filtering and in the INTRIGUE system (Ardissono et al, 2002), both of which use a weighted additive utilitarian strategy.

	A	B	C	D	E	F	G	H	I	J
John	10	4	3	6	10	9	6	8	10	8
Adam	1	9	8	9	7	9	6	9	3	8
Mary	10	5	2	7	9	8	5	6	7	6
Group	1	9	8	9	7	9	6	9	3	8

Group List:
F H D B J C E G I A

2.4 Summary of strategies and the issue of Satisfaction

As is clear from the summary table below, the different strategies described led to quite different results when applied to our example. One major difference between strategies is the emphasis placed on *individual* satisfaction, particularly *avoidance of misery*, compared to the satisfaction of the *majority* of the group. A clear example is the location of A in the group lists, an item that is very much hated by Adam (rating 1), but loved by both John and Mary (ratings 10). Plurality Voting puts A at the top of its list, and it ranks also highly in the lists of the Copeland, Borda, Most Pleasure and Fairness strategies. In contrast, the Average Without Misery strategy completely ignores A, and A also ranks at the bottom of the lists of the Least Misery and Utilitarian Multiplicative strategies.
A second major difference between the strategies is whether they use only the relative position of items in each individual's preference list, or also the strengths of these preferences. The Plurality, Copeland, Borda, and Most Respected Person strategies only use relative positions, unlike the Utilitarian, Least Misery, Average Without Misery, and Most Pleasure strategies.

Table 1. Summary of group lists produced by the strategies discussed above when applied to our example.

	1	2	3	4	5	6	7	8	9	10
Fairness Strategy	Depends on order of choice, but A within first three items.									
Most Pleasure	A or E or I			B or D or F or H				C or J		G
Plurality Voting	A	E	F	I or D		H	J	B or G		C
Copeland Rule	E	A	F	I	D	H	J	B	G	C
Borda Count	F	E	A	H or D		I	J	B	G	C
Utilitarian Multiplicative	F	E	H	J	D	I	B or G		A	C
Least Misery	F	E	H or J or D			G	B	I	C	A
Average Without Misery Threshold 4	F or E		H	J or D		I	B			
Average Without Misery Threshold 3						B	G			
Utilitarian Additive	F or E		H	J or D		A	I	B	G	C
Approval Voting Threshold 6	F or E		H or J or D or A or I					B or C		G
Approval Voting Threshold 5	F or E or H or J or D					A or I or G			B or C	
Most Preferred Person Adam	F	H	D	B	J	C	E	G	I	A

As discussed in Section 2.2, we believe strategies should have a property like "*Each individual's satisfaction with the results should be above a certain threshold*". So, to determine how good the strategies are we need a way of *measuring* each individual's satisfaction with the sequences they produce. Note that this is something the choice strategies do not tell us. One way of doing this would be to have a *Satisfaction Function* that takes as input a sequence and an individual's and their friends' ratings and produces as output a number that quantifies the individual's satisfaction with that sequence. Ideally, such a Satisfaction Function would be empirically validated, for example by predicting individuals' satisfaction with sequences and then measuring in an experiment how satisfied they really are (see Experiment 2, Section 4). A good Satisfaction Function would be a fast way to test how strategies perform under many different circumstances (like group size, ratings, sequence length, etc.). Additionally, the construction of a good Satisfaction Function would provide valuable insights into what makes a good strategy.

A basic Satisfaction Function

In its simplest form, a Satisfaction Function would take as input a *set* of ratings for any sequence of clips and produce as output a real number. One such function that has been used a lot is *Addition*: the summation of the individual's ratings of the clips concerned. So, for instance, John's satisfaction with FEAHD would be 43 (9+10+10+8+6), while Mary's would be 40 (8+9+10+6+7). Though without thresholds we cannot say whether these numbers amount to high or low satisfaction, the function would predict that John would be more satisfied than Mary.

The issue of normalization

A basic Satisfaction Function as sketched above only considers the ratings of the selected clips. It does not take into account how these ratings compare to those of the *unselected* clips. So, for instance, ratings of "6 5 6 7" would produce the same satisfaction whether the other clips had ratings of "9 10 10 10 10 9" or "1 2 1 3 1 4". To counteract this, *normalization* can be used, by dividing the sum of ratings of the selected clips by the maximal "possible" sum for that individual. For instance, the maximum sum for John for a sequence of five items is 47 (namely 10+10+10+9+8), while the maximum for Mary is 41. So, John's satisfaction with FEAHD would be 0.91 (43/47), while Mary's would be 0.98 (40/41). We could then conclude that Mary would be more satisfied than John (in contradiction with the results without normalization). Normalization is one way to counteract differences in rating tendencies.[2]

The issue of linearity

An issue that has not been taken into account by any of the described strategies is that ratings are not necessarily linear. The question arises whether the difference between a "9" and a "10" should really be as big as between a "6" and a "7". We have the hypothesis that the further away from the middle point of the scale (in our example 5.5 can be seen as Neutral), the larger the difference between subsequent ratings. So, both the differences between a 9 and a 10 and between a 1 and a 2 are larger than the difference between a 6 and a 7. To achieve this, we could convert the ratings "1 2 3 4 5 6 7 8 9 10" for our satisfaction function into " –25 –16 –9 –4 –1 +1 +4 +9 +16 +25". This has for instance as a result that FE would give Mary a higher satisfaction (16+4=20) than JC (9+9=18), while the satisfaction would be equal if ratings were considered linear (FE= 9+7=16, JC = 8+8=16).

The issue of misery

Another question is whether satisfaction depends on pleasure only (the sum of the positive numbers as a proportion of the maximum achievable pleasure) or whether it is also affected negatively by disagreeable experiences (more than because of losing out on possible pleasure).

The issue of order

Until now, we have considered the Satisfaction Function to take as input a *set* of ratings (whether only of selected or also of unselected items). This assumes that the *order* of the sequence does not impact the Satisfaction. However, the impact of viewing an item on the user's happiness is likely not only to depend on the viewer's liking for the item in isolation, but also on the *context* in which the item is shown. It is well known in the advertising world that the context of an advertisement has an impact on its effectiveness and resulting brand evaluation. In particular, studies have shown that the viewer's *mood* (as induced by watching the preceding

[2] Note that normalization only works when we assume each individual to have some items they like. For instance, we would not want to conclude that a selection of "2 2 2 2" with other items of "1 1 1 1 1", would make this individual 100% satisfied.

program) has a significant effect on brand evaluations (Meloy, 2000; Gardner, 1985), with the viewer responding more positively if they were in a more positive mood. The *liking* of a television program has a similar significant effect (Murray, Lastovicka, and Singh, 1992; Schumann and Thorson, 1990). So, we hypothesize that an item that is rated as, say, a 3 could be perceived more highly after having watched a 10, and less highly after having watched a 1. There is also an interaction between the emotional tone of commercials and programs (Kamins, Marks, and Skinner, 1991): viewers preferred a sad commercial in the middle of a sad program, and a humorous commercial in a humorous program. This forms the basis for consistency theory, which suggests that viewers try to maintain a mood throughout a program. For example, after watching a "September 11th" news item, viewers might prefer watching another sad item, rather than a funny one, even when normally they would rate the funny one higher. Other content aspects are also likely to play a role. An item about "the position of the Kurds in Iraq" may be appreciated more than its individual rating suggests, after having just seen an item about "the US position on Iraq".

The issue of solidarity
Is it possible to determine an individual's satisfaction without considering the satisfaction of the others in the group? Would a person be as satisfied with a certain sequence when his friend got a sequence of "1 2 1 3" as he would be when his friend got a sequence of "7 8 6 8"? Hogg and Jennings (1999) deal with this issue in multi-agent systems by adding a weighted measure of the satisfaction of the society. They consider weights between 0 (a very selfish agent) and 1 (a very sociable agent). In fact, the situation could be even more complicated: somebody could be jealous of the pleasure of their friend, so their satisfaction would decrease if their friend's ratings increased. Note that this is quite likely when siblings are watching television together.

So, how do we decide which is the best Satisfaction Function? A way to find such function is to determine some plausible functions *before* measuring (reported) human satisfaction in an experiment, and to use these functions to *predict* the experimental outcomes. A comparison between the predictions and the real outcomes would then produce insights into the relative merits of the Satisfaction functions and their weaknesses. Additionally, the experiment could produce the needed threshold value. We will report on such an experiment in Section 4. First, however, we have explored how people act when confronted with the task our strategies perform.

3 Experiment 1: How real people do it

One can easily create hundreds of strategies (the strategies above are only the tip of the iceberg). The important question is which strategy is most effective and will be most liked by viewers. As a starting point, we want to determine what strategy real people use. We have performed a first experiment to explore this.

3.1 Experimental design

Method
Subjects were divided into two groups, experiencing different experimental conditions. In both conditions, subjects were given the same individual ratings of three people, John, Adam, and Mary, for a set of video clips. In seven questions, they were asked which clips the three should view as a group, given that they only had time to see respectively 1, 2, 3, 4, 5, 6, or 7 clips, and why they made that selection. The task presented to both groups differed only in that in condition 2, "John, Mary and Adam" had been replaced by "John (29), Mary (32), and their grandfather Adam (81)" (see Appendix A for exact task wordings). A between-subject design was used, as a pilot test revealed large order effects: subjects felt compelled to change their group ratings in favor of Adam, if they received condition 2 *after* condition 1. The individual ratings had been chosen primarily to enable differentiating between the strategies we expected subjects to use (same ratings were used as in Section 2). In addition, we ensured that John and Mary had quite similar ratings, while Adam's ratings were frequently the opposite of the ratings of the other two. We also ensured that for one clip, namely clip A, John and Mary had maximal positive ratings (10), while Adam had a maximal negative rating (1). The latter would give a good idea of the importance subjects assigned to avoiding misery. The ratings can also be seen as representing different rating behavior: Adam has not used the maximum of the scale (10), while John has used it three times.

Research questions
We wanted answers to the following research questions:

- Do subjects follow a clear strategy? Is it possible to describe subjects' individual behavior in terms of a logical strategy? Are the strategies discussed above being used?
- Is there a dominant strategy? Is one strategy used by a majority of subjects, and, if so, which strategy is it?
- Do subjects take pleasure, misery, and fairness into account? Which do they find most important?
- Do subjects follow the rules (exhibit the desirable properties as discussed in Section 2.2)?
- Is social standing taken into account? Does subjects' behavior change if one person in the group can be regarded as more important?

We expected the results of both experimental conditions to provide some answers to the first four questions, and the difference between the conditions to provide some insight in the last question. Our hypothesis was that in Condition 2, Adam would be regarded as more important (because of his age), and the selections would be more geared toward his taste. Note that we have deliberately chosen to make this experiment an *indirect* one: rather than having an actual group sit down to decide what to watch, subjects were asked what they *thought* people should watch. There are two reasons for this. Firstly, we really wanted our subjects to think about what would be best for the group as a whole. Giving them a role to play (i.e. to represent John, Adam or Mary) could lead to them trying to defend their own interests (even with clear instructions to consider the group as a whole). Secondly, as discussed in our literature review in Section 2, individuals behave differently depending on who else is in the group. Some people tend to be more accommodating of others, some are more timid and others more outspoken, some are better at arguing their case, or are just more respected. We did not want the eloquence with which John, Mary and Adam argued their case to influence the outcomes.

Subjects

Thirty nine subjects participated in the experiment. All were final-year undergraduate students of the IT faculty attending a lecture of the Adaptive Interactive Systems module. The students were studying various courses (B.A. Computer and Information Systems, B.Sc. Computer Studies, B.Sc. Computer Science, and B.Sc. Software Engineering). The experiment took place in a lecture room. Subjects were assigned to experimental condition depending on where they sat: the left of the room was assigned to condition 1 (18 subjects, 16 male, 2 female, average age 28, standard deviation 9.7), the right to condition 2 (21 subjects, 15 male, 6 female, average age 24, standard deviation 3). Students participated in the experiment voluntarily (in addition to the numbers mentioned above, 9 students chose not to participate). The spread over courses was similar for both conditions.

3.2 Results and discussion

Subjects do not seem to answer the questions independently: they responded which new clip should be added to the sequence they had already chosen for the previous question. This made it possible to present the results in the way we have done in Tables 2 and 3 (for respectively, Condition 1 and 2), only showing the new clip selected for each question. However, from an experimental point of view, this is not ideal: it might have influenced their strategy, making it perhaps less likely that they use the "fair strategy" (which only makes sense when selecting a larger group of clips). We need to explore whether the results would be different if we asked the subjects immediately to select, say, six clips. A between-subject design could be used to distinguish between different set sizes.

Table 2 shows the results for Condition 1, and Table 3 for Condition 2. As can be seen in the tables, subjects did not always make a unique selection for a clip, sometimes they answered "D or J". We have tried to keep the tables as simple (and uncrowded) as possible: if a cell does not have a clip name in it, then the first name above it applies. For instance, sub11 replied F to the first question. Subjects have been ordered to make the tables as easy to view as possible. The tables include information about how well the subjects' replies fit some of the strategies discussed in Section 2:

- Bold borderlines indicate replies that are in correspondence with the Average Strategy. So, for instance, all replies of sub14 were the same as those by the Average Strategy. The first two replies by sub16 were the same as those by the Average Strategy, but sub16's later replies differed.
- Gray cell shading indicates replies that are in correspondence with the Least Misery Strategy. So, for instance, all replies of sub11 were the same as those by the Least Misery Strategy. The first three replies by sub16 were the same as those by the Least Misery Strategy, but sub16's later replies differed.
- Bold dotted borderlines indicate replies that are in correspondence with the Average Without Misery Strategy. So, for instance, all replies of sub2 were the same as those by the Average Without Misery Strategy.

Table 2. Results for Condition 1 (see above for meaning of shading and borderlines).

	1	2	3	4	5	6	7	Summary[3]
sub14	E	F	H	J	D	A	I	Average Strategy throughout
sub2	F	E				I	B	Average without Misery Strategy throughout
sub11						G	B	Least Misery Strategy throughout
sub10								
sub4							I	Least Misery Strategy, except for last choice
sub7							A	
sub9				D or J	D or J	A	I	Average Strategy throughout
sub17				D	J	B	G	Average without Misery Strategy throughout
sub3			J	H	D	G	I	Least Misery Strategy, except for last choice
sub18					G	D	B	First four choices correspond to Least Misery
sub16				G	H		A	First three choices correspond to Least Misery
sub6			A	H	J		I	Only first two choices correspond to strategy
sub13								
sub5			D			G	B	Least Misery Strategy throughout
sub1						A		Least Misery Strategy, except for last two choices
sub12		H	J	D	E	G		Only first choice corresponds to a strategy
sub15		G		E	D	H		
sub8			E	A	B	D	H	

Table 3. Results for Condition 2 (see above for meaning of shading and borderlines).

	1	2	3	4	5	6	7	Summary[1]
SUB1	F	E	H	J	G	D	B	First four choices correspond to Least Misery and Average strategies
SUB2					D	B	G	Average without Misery Strategy throughout
SUB14								
SUB8						A	I	Average Strategy throughout
SUB16								
SUB11								
SUB20						G	A	Least Misery Strategy, except for last choice
SUB12							B	Least Misery Strategy throughout
SUB5						I		Average without Misery Strategy throughout
SUB9					A	D	I	First four choices correspond to Least Misery and Average strategies
SUB15				A	D	J		Only first three choices correspond to a strategy
SUB19				D	J	A		Average Strategy throughout
SUB10						G	B	Least Misery Strategy throughout
SUB3							A	Least Misery Strategy, except for last choice
SUB4			D	H			I	
SUB18			G	J	H	D	B	Only first two choices correspond to a strategy
SUB21		G	D			B	E	Only first choice corresponds to a strategy
SUB17		J	H	E	D	G	B	
SUB13		H	D		J			
SUB6	E or F	E or F	H	J or D	D or J	A	I	Average Strategy throughout
SUB7	E	F	J	A	H	G	D	Only first two choices correspond to a strategy

[3] When we say something like "Average Strategy throughout", we mean that the subjects' choices are identical to those of this strategy. This does not necessarily mean that the subject was consciously applying this strategy.

Note that strategies can have overlapping starts of their group lists. For instance, both the Average Strategy and the Least Misery Strategy allow a start of FEHDJ. This means that cells can have both a gray cell shading and a bold borderline. So, for instance, sub7's replies followed the Average Strategy for the first five clips, and in correspondence with the Least Misery Strategy for the first six clips. Also, note, we have only used the Bold dotted borderlines, when the Average Without Misery Strategy starts deviating from the Average Strategy.

Do subjects follow a clear strategy?
There is evidence that human subjects use the strategies mentioned above, particularly the Average Strategy, the Average Without Misery Strategy and the Least Misery Strategy.

- *Average Strategy.* Two subjects in Condition 1 (sub14 and 9) and five subjects in Condition 2 (SUB8, 16, 11, 19, and 6) exactly followed the Average Strategy. Their papers tended to show additions on them.
- *Least Misery Strategy.* Three subjects in Condition 1 (sub11, 10, and 5) and two subjects in Condition 2 (SUB12, and 10) exactly followed the Least Misery Strategy. Three subjects in Condition 1 (sub4, 7, 3) and three in Condition 2 (SUB 20, 3, 4) followed the Least Misery strategy almost completely. For clip 7, three selected A ("while Adam hates it, the others really like it so he will just have to put up with it", "Mary seems to lose out in most clips, so A is for her", "Might as well please two out of three"), three selected I ("Closest", "At least the majority will be satisfied").
- *Average Without Misery Strategy.* Two subjects in Condition 1 (sub 17, 2) and three subjects in Condition 2 (SUB2, 14, 5) exactly followed the Average Without Misery Strategy. Three subjects used a threshold of 4 or 5 and two subjects (sub2, SUB5) used a threshold of 2 or 3. As expressed by one subject "I try to please all of them making sure that no is lower than five". Note that the resulting sequence for the Average Without Misery Strategy for a threshold of 2 or 3 coincides with Multiplicative Utilitarianism (but no signs of multiplications where found on the papers).
- *Fairness Strategy.* Two subjects (sub6, 13) used some kind of a Fairness Strategy. Both selected A relatively early. They made comments like "Although Adam gave 1 mark for A, he gets to see F", "Although some gave some clips low marks, they all get to see some they rated highly". Other subjects applied fairness towards the end: "Mary 's average ratings have been low, so give her something she will enjoy" (sub1, explaining selecting A), "Mary seems to lose out in most clips, so A is for her" (SUB3), "As Adam did not like A, pick D next as he scored it a 9" (SUB15).
- *Approval voting.* The subjects' explanations did not show any sign of using Approval voting. Nevertheless, thirteen subjects' sequences fall within those permitted by Approval voting with threshold 5, and eleven within those permitted by Approval voting with threshold 6 (seven of which are in common with threshold 5). These seem high numbers, but it has to be taken into account that Approval voting (particularly with threshold 5) did not put many restrictions on the sequences it allowed.
- Nobody used plurality voting (in either form) and nobody used the Copeland rule. Nobody completely followed the Borda count (though two subjects' behavior on the first four items coincides with it: sub6 and sub13).

Is there a dominant strategy?
There does not seem to be a clearly dominant strategy, but Average, Average Without Misery, and Least Misery are all plausible candidates for implementation. Fairness plays a role, but our human subjects did not have a clear strategy for applying it.

Do subjects take misery into account?
Many subjects take misery into account, as evidenced by the high proportion of subjects using the Least Misery and Average Without Misery strategies. Even subjects that do completely deviate from the Least Misery or Average With Least Misery strategies, like sub12, sub15, SUB21, SUB18, SUB17, and SUB13 avoid misery: all left out A and I from their selection. Therefore, preference should be given to a strategy that takes misery into account.

Is social standing taken into account?
We did not find any statistically significant differences between the conditions. Only one subject explicitly mentioned age as a reason for a selection: "A is not chosen because only the young ones like the topic" (SUB5). Our intention of making Adam the most respected person did not completely succeed: one subject (SUB7) actually mentioned "Adam's scores have been ignored to some extend because of age", another (SUB21) said "overall pick the average highest, if there is any difference attempt to match the two people with the same age". Overall, it seems that this part of the experiment was not successful: in future we will have to make it more obvious that one person is socially more important (perhaps by making it their birthday).

Do subjects follow the rules?
No, subjects sometimes exhibit completely unexpected behavior. Four subjects in Condition 1 and four in Condition 2 selected G (ratings 6,6,5) before D (ratings 6,9,7). This seems rather illogical, and breaks the Pareto rule. Two of these subjects explained using disparities in ratings as a basis for selection. This would mean that a group is happy if everybody were equally happy or miserable. Overall, ten subjects broke the Pareto rule, in the following manners:

	B (4,9,5) before D (6,9,7)	B (4,9,5) before H (8,9,6)	G (6,6,5) before D (6,9,7)	G (6,6,5) before H (8,9,6)	G (6,6,5) before J (8,8,6)	G (6,6,5) before E (10,7,9)	J (8,8,6) before H (8,9,6)
sub8	x	x	x	x	x	x	
sub18			x				x
sub16			x	x			x
sub15			x	x	x	x	x
sub3							x
SUB1			x				
SUB18			x	x	x		x
SUB21			x	x	x	x	x
SUB7			x				x
SUB17							x

The only plausible explanation seems to be that subjects thought fairness to be more important than pleasure.

Subjects also do not follow the Condorcet winner criterion. In its stronger form, A and E were both Condorcet winners, but almost all subjects started their sequence with F. This backs up our resistance against the Condorcet winner criterion.

4 Experiment 2: How people judge the sequences produced

In the previous experiment, we have investigated what strategies people follow and what they find important when making a decision on behalf of a group (for instance, misery, fairness, etc). However, the fact that, for instance, many people used a Least Misery strategy does not necessarily mean that our television should use this strategy (though it seems a reasonable option, given the results of Experiment 1). Similarly, the fact that nobody used the Copeland rule does not necessarily mean that the television should definitely not use that strategy. Perhaps that strategy was just to complex for a human to apply. In this experiment, we have turned the game around: instead of asking subjects to produce a satisfying sequence, we have presented subjects with sequences produced by the strategies, and asked them how satisfied they would be with such a sequence. We wanted to determine which strategy produces the most *satisfaction* for all members of the group. To gain a better understanding of what determines an individual's satisfaction, we have also compared a number of satisfaction functions (see Section 2.4) to see which provides the best predictions.

4.1 Experimental design

Method
Subjects were told that they were going to watch video clips with their two friends. They were given the same individual ratings of three people, themselves, Friend1, and Friend2, for a set of video clips. The ratings used were the same as those in Experiment 1, with John's ratings corresponding to their own, Adam's ratings to Friend1's, and Mary's ratings to Friend2's.[4] They were told the TV had selected a sequence of clips for them, and were asked how satisfied they and their friends would be given that sequence, and why. This was repeated

[4] We decided to use "Friend1" and "Friend2" rather "Adam" and "Mary" to avoid any influence on the subjects' behavior. After all, names imply gender. It would have been better to use three male names in Experiment 1. Though we did not detect any influence, we decided to avoid the risk in this experiment.

three times: all subjects were given three different sequences on three pieces of paper, stapled together. (See Appendix B for the exact wording.) The table below shows the sequences used, and the reason for using them:

Sequence	Reason
FEAHD	Social choice according to Borda Count
EAFID	Social choice according to Copeland rule
AEFID	Social choice according to Plurality voting (one for one)
FEHJDI	Social choice according to Utilitarian multiplicative
EFHDJB	Social choice according to Average without misery
FEHJDG	Social choice according to Least misery
AEIBDF	Social choice according to Most pleasure
EFHDJA	Social choice according to Utilitarian additive
AIEFD	Social choice set according to Plurality voting and Copeland rule, but in another sequence with the most negative items for Adam at the start. Together with EAFID and AEFID used to see if the order of the sequence influences the results.

Sequences have been kept as short as possible, not to overburden the experimental subjects. Some of the sequences are longer (6 items) than others (5 items), because they would not distinguish between voting strategies otherwise. Though we used "I", "Friend1" and "Friend2" in the text of the experiment, we will use "John", "Adam" and "Mary" in our discussion (this makes it easier to compare between experiments).
Note: as before we have chosen for an *indirect* experiment: rather than having an actual group sit down and *measure* how satisfied each individual would be with a certain sequence, subjects were asked how satisfied they *thought* all members of the group would be. Measuring satisfaction would require subjects to really experience the clips, and this would have required a set of clips with ratings accurately reflecting our subjects' tastes. To compare multiple sequences, we either would need different groups of people with the same tastes (difficult to find and control) or use a within subject design. However, order effects could have been large, as showing a clip multiple times would influence its rating.

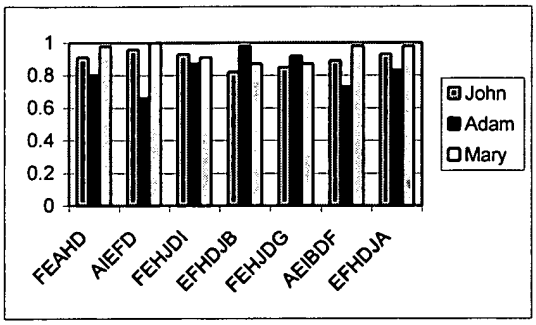
Satisfaction functions we will use to make predictions
We have used six simple satisfaction functions to predict the outcomes of this experiment:
1. Linear Addition without Normalization: The most basic satisfaction function discussed in Section 2.4, where the individual's ratings of the selected items are summed.
2. Linear Addition with Normalization: As the previous one, but now with normalization.
3. Quadratic Addition, Pleasure only, without Normalization: Ratings are transformed as described in Section 2.4 (10 becomes 25, 1 becomes –25 etc). The individual's *positive* ratings of the selected items are summed. Negative ratings are ignored.
4. Quadratic Addition, Pleasure only, with Normalization.
5. Quadratic Addition, Pleasure minus Misery, without Normalization: As Quadratic Addition, Pleasure only, but now the negative ratings are also incorporated in the sum.
6. Quadratic Addition, Pleasure minus Misery, with Normalization.

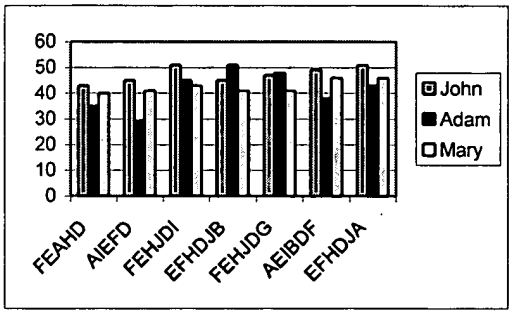
The differences in predictions between 1,3,5 on the one hand and 2,4,6 on the other hand will provide insight into whether subjects use Normalization. The differences in predictions between 3,4 on the one hand, and 5,6 on the other hand will provide insight into whether the subjects deduct misery. The differences in predictions between 1,2 on the one hand, and 3,4,5,6 will provide insight into whether subjects use the ratings as linear.

We have not used the order of the sequence as input for our satisfaction functions. We did consider adding a satisfaction function that uses the sequence of the ratings: increasing the added satisfaction of an item if the previous rating was high. However, we decided to leave this to future research, as we want to resolve some of the other issues first, and did not know enough yet about the influence ordering could have.

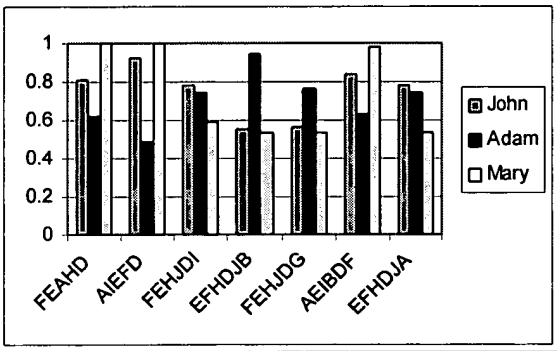
Predictions of the Satisfaction Functions

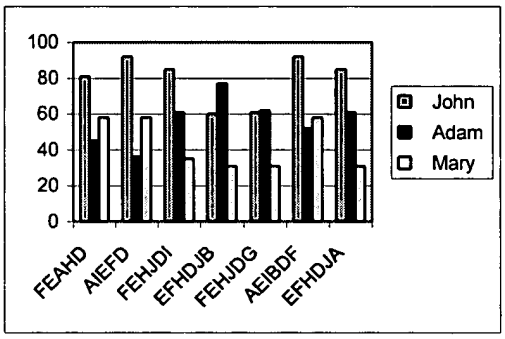
Linear Addition with Normalization (left) and without Normalization (right)



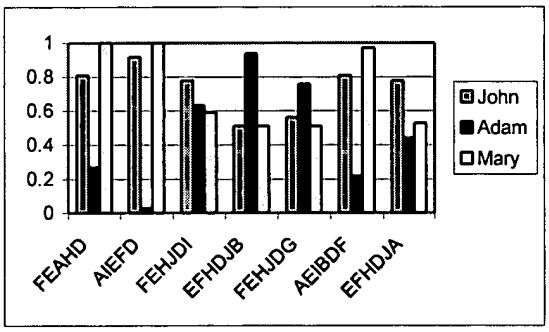


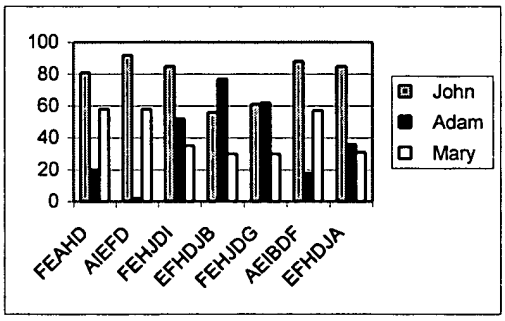
Quadratic Addition, Pleasure Only, with Normalization (left) and without Normalization (right)





Quadratic Addition, Pleasure minus Misery, with Normalization (left) and without Normalization (right)





Some of the more prominent differences:

- *Effect of Normalization.* (Comparing the left hand graphs with the right hand graphs).
  FEAHD, AIEFD, AEIBDF: John beats Mary without normalization, Mary beats John with normalization.
  EFHDJB: John beats Mary without normalization, Mary and John almost equal with normalization.
  FEHJDG: Adam beats John with normalization. John and Adam quite equal without. John beats Mary without normalization, and they are quite equal with normalization.
- *Effect of deducting Misery.* (Comparing the middle two graphs with the bottom two graphs).
  EFHDJA: Adam beats Mary without deduction of misery. With deduction, Mary beats Adam (or is almost equal to Adam, without normalization).
- *Effect of Quadratic versus Linear.* (Comparing the top two graphs with the bottom four graphs).
  FEHJDI: In Linear Addition, John and Mary are quite equal. In the others, John clearly beats Mary.
  FEHJDG: In Quadratic, Adam clearly beats Mary. In Linear, Adam and Mary are quite equal.

EFHDJA: In Linear, Mary beats John (or is equal to John without normalization). In Quadratic, John beats Mary.

Research questions

1. Is one of our satisfaction functions a good predictor of subject behavior? The satisfaction functions above predict how each individual's satisfaction compares to that of the other two individuals for a particular sequence, as well as how it compares to their own satisfaction for other sequences. For instance, according to the Quadratic-Addition-Pleasure-Only satisfaction functions, John and Mary would be more satisfied with AIEFD than Adam, and both would prefer AIEFD to FEHJDI. The predictions of the various satisfaction functions differ, and in the experiment we can compare these predictions with the satisfactions as indicated by our experimental subjects. A main question was whether the predictions of one our satisfaction functions would closely match those of our subjects. We also wanted answers to the following related questions, to better understand what makes a good satisfaction function:
   - Do subjects use *normalization*?
   - Do subjects deduct *misery*?
   - Do subjects use *linear rating scales*?

   We can use the differences in predictions as discussed above to answer these three questions.
   If one of the satisfaction functions is a very good predictor, then it might be possible to also determine thresholds. Let s be the predicted satisfaction of an individual with a sequence. We would like to determine thresholds t1, t2, t3, t4 and t5, such that:
   - $s < t1$: individual is very dissatisfied with the sequence (score of 1 on the scale of the experiment)
   - $t1 \leq s < t2$: individual is dissatisfied with the sequence (score of 2 or 3 on the scale)
   - $t3 \leq s < t4$: individual is satisfied with the sequence (score of 5 or 6 on the scale)
   - $t4 \leq s$: individual is very satisfied with the sequence (score of 7 on the scale)

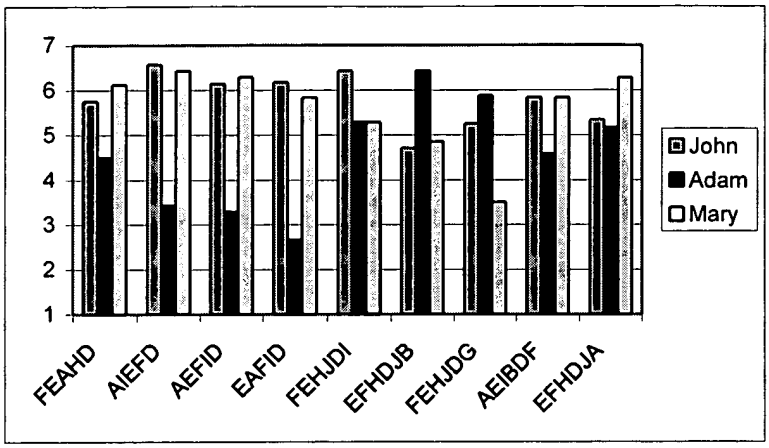
   If one of the Normalized satisfaction functions were a good predictor, then all thresholds would have to be between 0 and 1.
2. Does the *order of the sequence* influence subjects' satisfaction ratings? What aspects of order do subjects mention? We have given the subjects *sequences* of selected items, rather than sets. This allows the subjects to use this information if they want to. We hope that the subjects' explanations will provide us with more insight into how order influences satisfaction. To study this further, we have included three experimental conditions (EAFID, AEFID, AIEFD) that are exactly the same, with the same set of items being selected, except that they are presented in a different order. Note that in our experiments we have deliberately abstracted items (A to J) instead of telling the subjects about the item content. This ensures that subjects use the ratings provided rather than their own personal opinions. This has as side effect that the subjects cannot use content information (the emotional tone or how the content is related to the content of other items). So, our experiment will be restricted to the impact of the *ratings profile* of a sequence on satisfaction (for instance, exploring the difference between "7 1 9 3 9" and "1 3 7 9 9"), and not the emotional or content profile. It might be possible to change this in a future experiment, but it is a tricky issue to handle: for instance, telling subjects an item is 'sad' might influence their opinion of that item in isolation, not just as part of a sequence.
3. Do subjects use *social aspects* to determine individual satisfaction? We have not used social aspects (solidarity or jealousy) in our satisfaction functions. Without having resolved the other issues first, it would have led to an explosion in possible satisfaction functions. Even more so, as the selfishness/sociality of our individual subjects would have an impact, and different 'average sociality' weightings would have been needed for the predictions. However, we hoped that subjects' explanations would indicate whether they had taken social aspects into account.
4. Is there one strategy (or multiple ones) that is clearly better than the others, in terms of keeping all members of the group happy? As subjects would indicate the satisfaction of all members of the group, we could investigate whether there is a sequence (i.e. the result of a particular selection strategy) with positive satisfaction (i.e. score 5 or above) on average --or better even for all subjects-- for all members of the group.

Subjects

Twenty-two subjects participated in the experiment. All were academic staff of the University of Brighton. Subjects were assigned to experimental condition at random. To control for order effects, each sequence appeared similarly often as first, second and third paper. Permutated sequences AIEFD, AEFID, and EAFID were not given to the same subjects, so, there was a complete between-subjects design for those. Each sequence was studied by at least seven subjects (some by eight).

4.2 Results and discussion

The figure below shows the average satisfaction scores per condition.



Do subjects use normalization?
Comparing the results with the prominent differences between the predictions of the satisfaction functions (see Section 4.1), we find:

- FEAHD: There is a trend that Mary beats John, as predicted by normalization. This is not statistically significant, but "without normalization" predicted John to beat Mary.
- AIEFD, AEIBDF: John and Mary are quite equal, which is more in tune with normalization.
- EFHDJB: Mary and John almost equal, as predicted by normalization.
- FEHJDG: There is a trend that Adam beats John, as predicted by normalization, but this is not statistically significant. However, John clearly beats Mary, as predicted by "without normalization" (this is statistically significant, $p<0.01$).

So, overall, there is some evidence that normalization has taken place, but with a contradictory result for FEHJDG (which is a strange case, as will be discussed below).

Do subjects deduct misery?
Comparing the results with the predictions of the satisfaction functions (see Section 4.1), we find:

- EFHDJA: There is a trend that Mary beats Adam as predicted by deducting misery. This is not statistically significant, but without deducting misery it was predicted that Adam beats Mary.

So, there is some evidence that misery is taken into account (deducted). This is in line with the results of Experiment 1.

Do subjects use linear rating scales?
Comparing the results with the predictions of the satisfaction functions (see Section 4.1), we find:

- FEHJDI: John beats Mary, as predicted by Quadratic. This is statistically significant ($p<0.01$).
- FEHJDG: Adam clearly beats Mary, as predicted by Quadratic. This is statistically significant ($p<0.001$)

So, there is clear evidence that Quadratic is a better measure than Linear.

Does the order of the sequence influence satisfaction?
Order is mentioned by six subjects:

- One subject (S22) mentioned that the first clip mainly influenced his ratings. Another subject (S3) explained a low rating for Adam in AIEFD: "had to endure his two least favorite clips. Then he gave up and went away."
- One subject (S20) considered how the individuals' experience changed over time. For FEHJDH he mentions the problem of John feeling a decline of "quality" from the second clip onwards. He also mentioned that John would be quite satisfied with EFHDJA "ending in a high" (in addition to seeing good clips). In support of this, another subject explained a low satisfaction of Adam with EFHDJA by "never finish on a bad one"

(S7). A third subject (S18) shared this interest in the end of the sequence: she mentioned that Adam and Mary would be more satisfied than John with FEAHD (contrary to general belief) because they get more favorite clips towards the end. She also gave John a low rating (3) for EFHDJA because she assumed it to be boring to see too many favorites in a row!

- One subject (S13) explicitly indicated not having taken order into account.

No statistically significant differences were found between the results of EAFID, AEFID, and AIEFD. This is not surprising given the small number of subjects who mentioned order. Most subjects treated the sequences as sets. The ordering issue will need to be studied further in future experiments, particularly investigating the impact of the start of the sequence, the end, and the increase or decrease of pleasure over time.

Do subjects use social aspects to determine individual satisfaction?

Most subjects did not explicitly do so.

- Only three subjects (S15, S12, and S11) mentioned taking the mood of the others into account when determining the satisfaction of an individual. Another subject (S16) mentioned "If satisfaction depends on others being satisfied I could not assess this, because there was too much to hold in short-term memory. I had no overall model of the situation, and merely did the three evaluations independently."
- One of these subjects (S11) mentioned that it would be important to know more about the context: "if watching at your own house, your visitors' satisfaction becomes more important".

Is one of the satisfaction functions a good predictor?

Comparing the average profile above with the profile of the normalized "Quadratic Addition, Pleasure minus Misery" satisfaction function, it can be concluded that they are quite similar. There are, however, still a number of noticeable differences:

- Adam's satisfaction for AIEFD (and its permutations) is low, but not as low as predicted. Similarly, Adam's satisfaction for AEIBDF is higher than expected. Perhaps the numbers associated with low ratings (like –25 for a rating of 1) should be less negative than we have them. So, deducting misery, but less severely.
- The difference between John's and Mary's satisfaction for FEHJDG is larger than expected. Comparing Mary's satisfaction for FEHJDG with that for EFHDJB shows a significant difference ($p<0.05$). This is strange as the only difference between both sequences (except order) is the G in one sequence and the B in the other, both of which have the same rating for Mary. Perhaps subjects did take a social aspect into account: preferring B (which at least gives pleasure to Adam) to G (which gives pleasure to nobody), and feeling more upset about missing favorite A because G pleases nobody. Many subjects mention missing A as the reason for giving a low mark.
- John's satisfaction for EFHDJA is lower than expected (compared to Adam's and Mary's satisfaction). This might be partly caused by the somewhat odd behavior of subject S18 (See order section above). Another subject mentioned giving John a low rating (3) because of missing out on one of his favorites (I).
- The last two points (and the frequency with which subjects used the argument of missing the favorite for giving a lower mark) indicates that a higher weight has to be given to favorites, such that satisfaction goes down when all favorites are missed.

These differences have made it impossible to determine thresholds.

Is there a strategy that keeps everyone happy?

On average, John, Adam and Mary were all reported to be *not dissatisfied* with FEAHD (Borda Count), FEHJDI (Multiplicative Utilitarian), EFHDJB (Average without Misery), AEIBDF (Most pleasure) and EFHDJA (Additive Utilitarian). Looking at individual subjects' responses, FEHJDI (Multiplicative Utilitarian) is the only sequence that has ratings of at least 4 for all subjects for all individuals. The average ratings for this sequence are even above 5 for John, Adam, and Mary, showing a certain degree of satisfaction for all of them. So, Multiplicative Utilitarian seems the most promising strategy, but the others are not bad either. Of course, we need to investigate this issue further, using different individual ratings and different lengths of the sequence. However, on the basis of this experiment, we can reduce the number of strategies to be investigated (discarding Copeland rule, Plurality voting, Least misery).

Other issues

- One subject mentioned that the length of the clips would be important. (S19) This is a valid point, as viewing something you hate for five minutes or an hour would indeed make a big difference.

- One subject mentioned that other factors would influence satisfaction, like the discussion on the basis of the clips (S18).
- Almost all subjects talked about including (or not having included) the favorite clip(s). This seemed to be a more important issue than expected.

5 Algorithms for presenting a sequence: the issues of order and ratings

Until now we have focused on how a *set* of items suitable for a group can be selected based on the individuals' ratings. The television will also need to decide in which *order* to show the items. In this section, we will sketch three algorithms that take ordering issues into account, and we will empirically explore the assumptions underlying these algorithms.

5.1 Algorithms

Algorithm 1: Using the group list ranking
As the selection strategies described produce a ranked group list, the simplest algorithm is to show the items in the same order as they appear in the list. We have applied this method when producing the sequences for Experiment 2. The algorithm is depicted in Figure 1. Note that this algorithm might need to be slightly modified if the time durations of items vary. Television programmes (such as the news) tend to have a fixed length. Items, on the other hand, could have varying lengths, with one item being longer than another. It is possible that at the end of the sequence an item lower in the group list ranking needs to be selected to fill the available time, as the item which turn it was might be too long.

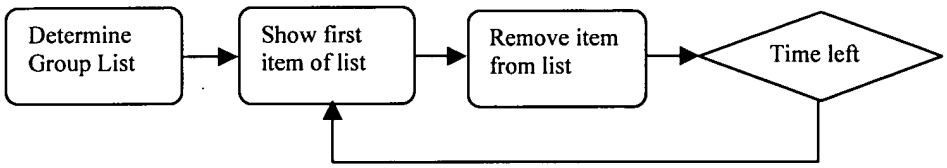


Figure 1. Algorithm for deciding sequence using group list ranking.

Algorithm 2: Changing order
Using the group list ranking to determine the order will produce a sequence with items liked by the group at the start and a decline in quality afterwards. However, this might not be the best order for keeping everybody optimally satisfied. As indicated in Section 2.2 we believe that a good sequence should keep each individual's satisfaction above a threshold at each moment during the broadcast. Our example in that section already showed that the order of the items impacts whether or not a sequence meets this criterion. Comments made by some subjects in the previous experiment show that there might be additional aspects that decide how good a sequence is, like having a strong ending. As discussed in Section 2.5, it is also likely that the *mood* induced by watching an item and the *topic* of an item influences what is the best item to show next. So, instead of showing items in the order of the group list, a more advanced algorithm could merely use the group list to decide which set of items to show and then order this set taking certain constraints into account. For instance, it could order the set such that the sequence

- *Keeps individuals sufficiently satisfied throughout the broadcast*: the predicted satisfaction of each individual at each point in the sequence is above a certain threshold
- *Has a strong ending*: The predicted satisfaction of each individual with the last M items is above a certain threshold
- *Exhibits consistency in mood:* The predicted mood induced by each two adjacent items in not "too wide apart" on a mood scale. For instance, it might be fine to succeed a "Very Happy" item with a "Happy" item, but not with a "Very Sad" item.
- *Has a good narrative flow:* Topically related items are as close as possible in the sequence.

Note that these constraints are both speculative and vague. Though they might seem reasonable, we have not proven yet that they are, and we have not specified them in detail (for instance, how far apart are two adjacent items allowed to be on the mood scale, what is the value of M, etc.). Also, the constraints could conflict: two

items can be highly topically related but induce widely different moods. In the experiment below we will explore our assumptions that mood and topical relatedness should have an impact on the order.

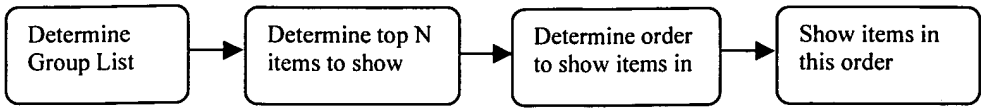


Figure 2. Algorithm for deciding sequence using ordering constraints.

Algorithm 3: Changing ratings

There seems to be one major flaw in the reasoning above: until now we have tacitly assumed that we can first select a set of items and then order them, ignoring that ratings might change as an effect of viewing an item. Having shown an item to the group, issues like mood consistency and topical relatedness might well lead to an item outside the selected set being more suitable to show next than the items in our selected set. We believe that the individuals' ratings should be recalculated taking into account the items they have seen so far. This leads to the algorithm depicted in Figure 3. Different rules could be used for the recalculation of ratings. For instance:

- If an item is topically related to the item shown, then increase its rating (by an amount proportionate to the relatedness).
- If an item has the same mood as the item shown, then increase it's rating, and decrease the rating if the moods conflict (by an amount proportionate with the intensity of the mood). A question is whether changes in ratings need to apply only for the duration of the next selection or for longer. For instance, suppose the TV shows a "very sad" item. This might lead to a reduction in ratings for "happy" items. If the TV were to show a "neutral" item next, should the ratings for the "happy" items be restored to their previous value, or remain reduced?
- If the (predicted) viewer's satisfaction is high after watching the items so far, then increase ratings, and if the (predicted) satisfaction is low then decrease ratings. To give an example of how this might work: Assume Adam is shown a number of items he likes. This gives him high satisfaction. Because of this, his ratings for other items (like the ones he normally hates) will increase. This makes it more likely these items will be selected (for instance, by passing the threshold in an Average Without Misery strategy). Assume as a consequence an item he normally hates is shown, like item A. This reduces his satisfaction and therefore his ratings for other items, making it more likely he will see something he enjoys soon.

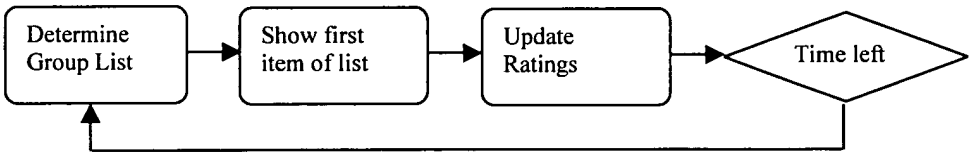


Figure 3. Algorithm for deciding sequence using rating modification.

Note that this algorithm allows items to be shown multiple times. This can be counteracted by sharply decreasing the rating of items that have been shown, or by adding a constraint to the "Show first item of the list" that it has to be the first item not already shown. Whilst showing a news item multiple times needs to be avoided, this might not be equally true for all types of programmes and viewers. Toddlers, for instance, very happily watch something they like multiple times. Similarly, a music clip might warrant watching multiple times for a fan. It seems therefore best to leave this issue to be dealt with by the sub-algorithm that determines each individual's ratings.

To investigate whether this algorithm is indeed better than the other two algorithms discussed, our next step is to explore if people do indeed adjust their ratings. More particularly, we would also like to gain insight into the effects of mood, satisfaction, and topical relatedness on the ratings of items after having viewed another item.

5.2 Experimental design

Method

Subjects were told that they were going to watch the evening news, and that the television would select a sequence of news items for them. They were asked to rate seven news items on how much they would want to watch them and how they might expect the news item to make them feel. After they had rated all seven items, subjects were told what the first item on the news was, an item that they had not yet seen. They were asked to rate this first item on how much they would want to watch it and how they might expect the item to make them feel. Next, they were asked to rate the other seven news items again, given that they had just watched that first item. There were two experimental conditions. In Condition A, the first news item was "Brighton University Watts Building on Fire: hundreds feared dead". In Condition B, it was "England football team has to play Bulgaria in the next round". (See Appendix C for the exact wording.) The table below shows the news items used, and the reason for using them.

News item	Reason
"[Insert name of your favorite sport's club] wins important game"	Expect that most subjects would want to see this item and that it would make them feel very happy.
"Fleet of limos for Jennifer Lopez 100-metre trip"[5]	This item and the next two were real news items that were chosen to be *not* topically related to the "England football team has to play Bulgaria in the next round" and "Brighton University Watts Building on Fire: hundreds feared dead" items.
"Heart disease could be halved"[5]	Expect that it would make most subjects happy.
"Is there room for God in Europe?"[5]	Expect that subjects would differ in opinion.
"Earthquake hits Bulgaria"	Expect that most subjects would want to see this item and that it would make them feel sad. Also picked "Bulgaria" to make this item weakly topically related to the "England football team has to play Bulgaria in next match" item.
"UK fire strike continues"	Expect that most subjects would not want to see this item at the start. The UK fire strike had already been in the news for months. Item is weakly topically related to "Brighton University Watts Building on Fire: hundreds feared dead" item.
"Main three Bulgarian players injured after Bulgaria-Spain football match"	Expect that most subjects would not want to see this item at the start. Item is strongly topically related to the "England football team has to play Bulgaria in next match" item.
"Brighton University Watts Building on Fire: hundreds feared dead" (only in Condition A)	Most of the subjects' lectures take place in Watts Building. We therefore expected them to be both very interested in and very sad about this item. Constructed to investigate the effect of mood.
"England football team has to play Bulgaria in the next round" (only in Condition B)	Topically related to two other items, with a different degree of relatedness. Constructed to investigate the effect of topical relatedness.

Research questions

We wanted answers to the following research questions:

- *Do people adjust ratings?* Does having watched the first news item influence the ratings for the other news items? If this is the case, then a new group list will have to be determined after each presented item, as in Algorithm 3 of the previous section. If the ratings stay the same, then we could apply an ordering algorithm to the group list, as in Algorithm 2 of the previous section. Our hypothesis was that in both conditions the ratings would change.
- *Does mood influence the way ratings are adjusted?* Condition A was constructed to test this. We expected all subjects to feel very sad after viewing the "Brighton University Watts Building on Fire: hundreds feared

[5] These news headlines were taken from the Yahoo news site http://uk.news.yahoo.com/ on 28-2-2003.

dead" item. Our hypothesis was that this would influence their ratings, particularly of items of a conflicting ("happy") mood, such as the "[Insert name of your favorite sport's club] wins important game" item.

- *Does topical relatedness influence the way ratings are adjusted?* Does having watched the first news item influence the ratings of topically related items to a higher extent than the ratings of topically unrelated items? Condition B was constructed to test this. Our hypothesis was that after watching the "England football team has to play Bulgaria in the next round" item, subjects would change their ratings for the "Main three Bulgarian players injured after Bulgaria-Spain football match" item, and, to a lesser extent, for the "Earthquake hits Bulgaria" item.
- *Does the subject's satisfaction influence the way ratings are adjusted?* Does a subject with a high rating for the first item increase the ratings of the other items? Does a subject with a low rating for the first item decrease the ratings of the other items? We can only test this on items that are topically unrelated and in the same mood (or these aspects might cause a change). Our hypothesis was that the rating for the "Earthquake hits Bulgaria" item would increase after having seen the "Brighton University Watts Building on Fire: hundreds feared dead" item, as both are sad items, topically unrelated, and the "on fire" item is expected to have a high interest rating.
- *Is there an interaction between these factors?* Is there an interaction between the subject's satisfaction of an item and the effect of topical relatedness on ratings for other items? Our hypothesis is that subjects who express an interest in the "England football team has to play Bulgaria in the next round" item are more likely to increase the rating of the topically related "Main three Bulgarian players injured after Bulgaria-Spain football match" item than subjects who were not interested.

Subjects

Thirty-four subjects participated in the experiment. All were final-year undergraduate students of the IT faculty attending a lecture of the Adaptive Interactive Systems module[6]. The students were studying various courses (B.A. Computer and Information Systems, B.Sc. Computer Studies, B.Sc. Computer Science, and B.Sc. Software Engineering). The experiment took place in a lecture room. Subjects were randomly assigned to an experimental condition. Students participated in the experiment voluntarily (in addition to the numbers mentioned above, two students chose not to participate). The spread over courses was similar for both conditions.

5.3 Experimental results and discussion

Influence of viewing an item on ratings for other items

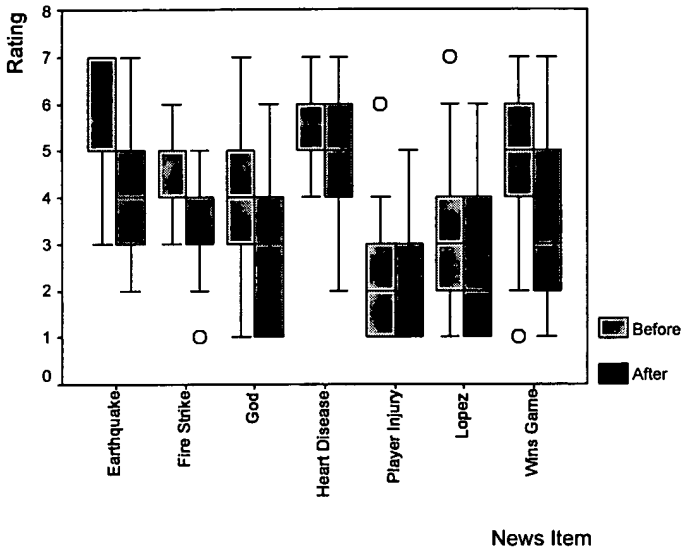
The results for Condition A ("Brighton University Watts Building on Fire: hundreds feared dead") clearly confirm our hypothesis that there can be a large influence of viewing an item on the ratings of other items. Figure 4 shows a dramatic decrease in ratings after seeing this item. All subjects modified at least one rating, and the difference in ratings was statistically significant. We can therefore conclude that Algorithm 3 is the best candidate.

Influence of mood

The results for Condition A ("Brighton University Watts Building on Fire: hundreds feared dead") were hoped to shed some light on the influence of mood. We clearly succeeded in producing an item that made all subjects expect to feel sad. All subjects chose "very sad", with the exception of two who chose the category just above that. However, we probably succeeded too well: subjects were expecting to be sad to the extent that most decreased their ratings across the board. Some subjects expressed this by making comments like "I would not be interested to see anything anymore, when worried about friends dying". This does confirm our hypothesis that mood can influence ratings, but not our more particular hypothesis about the way it would affect them. We did not find that the ratings of happy items decreased more than those of sad items. On the contrary, the Heart Disease item (judged by subjects as making them happy) showed a smaller decrease than the sad Earthquake item. So, contrary to our hypothesis and the literature described in Section 2, it might be that subjects actually prefer a happy item to distract them from the sad news. Subjects' comments also indicate that there is more to items than mood and topic: namely, an importance dimension. Subjects commented that after seeing the

[6] Note: this experiment took place almost a year after Experiment 1, so none of these subjects had participated before.

Brighton University On Fire item, they were no longer in the mood for irrelevant items, such as the Wins Game and Lopez items.



News item	Mean (St.Dev) Before	After
Wins Game	4.71 (1.99)	3.65 (2.18)
Lopez	3.18 (1.78)	2.47 (1.74)
Heart Disease	5.53 (1.07)	4.76 (1.39)
God	3.94 (1.89)	3.06 (1.78)
Earthquake	5.47 (1.28)	4.00 (1.41)
Fire Strike	4.71 (1.26)	3.65 (1.37)
Player Injury	2.41 (1.42)	2.00 (1.37)

Figure 4.Box plot and summary table for Condition A showing the mean, standard deviation, median, and quartiles, and outliers (circles) of the subjects' ratings for the various news items before and after seeing the "Brighton University Watts Building on Fire: hundreds feared dead" item.

We also did a small pilot test using an –as we thought- positive mood inducing item "War avoided by negotiation". This proved problematic: our pilot subjects varied in opinion on how happy this item would make them feel. Their comments show that this was due to the subjects' opinion on the desirability of avoiding a war in Iraq. Note that we never specified which war was supposedly avoided. This shows the difficulty in construction items with a certain fixed mood or interest.

Influence of satisfaction

We could not draw any conclusions about the influence of satisfaction from the "Earthquake in Bulgaria" item in Condition A, because the "University on Fire" item had had the unexpected effect of changing all ratings. Also, no effect was found in Condition B. Therefore, we have not found any proof to support the recalculation of ratings dependent on the rating of the previous item. However, we need still to investigate whether satisfaction would have an influence if there were no other influencing factors (like mood and topical relatedness). It might also be that the influence of satisfaction is not a *conscious* influence, one that people are aware of, and that a more realistic experiment in which subjects were really viewing video clips is needed.

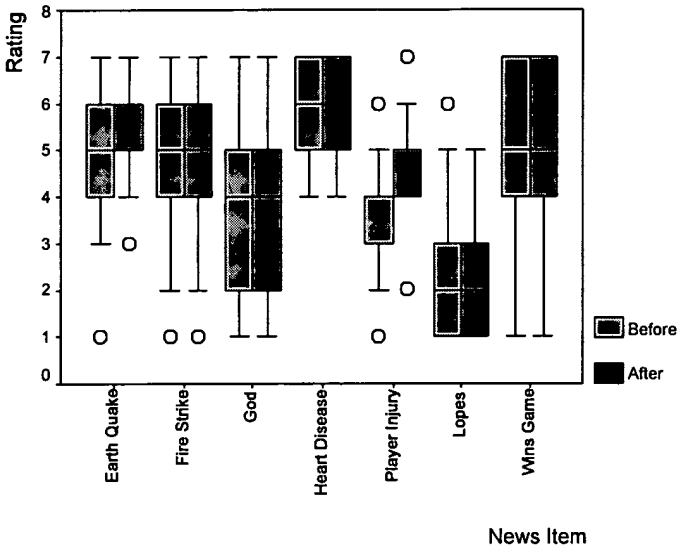
Influence of topical relatedness

The results for Condition B ("England football team has to play Bulgaria in the next round") confirm our hypothesis that viewing an item can influence the ratings of topically related items. Figure 5 shows that subjects increased the ratings of the topically related items, while the ratings of the topically unrelated items remained similar (actually, the means even show a small decline in ratings for these items). The strongly topically related "Main three Bulgarian players injured after Bulgaria-Spain football match" also showed a larger change in ratings than the weakly related "Earthquake hits Bulgaria".

Interaction between satisfaction and the effect of topical relatedness

We expected the effect of topical relatedness to depend on the interest the subject had for the item they viewed. For instance, if a subject were completely uninterested in the English football team, then we would not expect an effect on their ratings for the related "Main three Bulgarian players injured after Bulgaria-Spain football match". On the contrary, if a subject were very interested in the English football team, then we would expect their ratings for the related item to go up. Figure 6 shows the effect of watching the first (England-Bulgaria) item on the topically related items (Bulgarian Player Injury, and Earth Quake in Bulgaria) as a function of the subjects'

ratings for the first item. The figure to a certain extent supports our hypothesis, with the increases in ratings mainly for subjects who expressed some interest (rating 5 and above), and the decreases in ratings mainly for subjects who were not that interested (ratings 4 and below).



News item	Mean (St.Dev) Before	After
Wins Game	5.06 (1.92)	5.18(1.70)
Lopez	2.47 (1.51)	2.29 (1.40)
Heart Disease	5.76 (.97)	5.59 (1.06)
God	3.47 (1.81)	3.47 (1.66)
Earthquake	4.76 (1.52)	4.88 (1.36)
Fire Strike	4.47 (1.59)	4.41 (1.66)
Player Injury	3.76 (1.44)	4.18 (1.63)

Figure 5.Box plot and summary table for Condition B showing the mean, standard deviation, median, quartiles, and outliers (circles) of the subjects' ratings for the various news items before and after seeing the "England football team has to play Bulgaria in the next round" item.

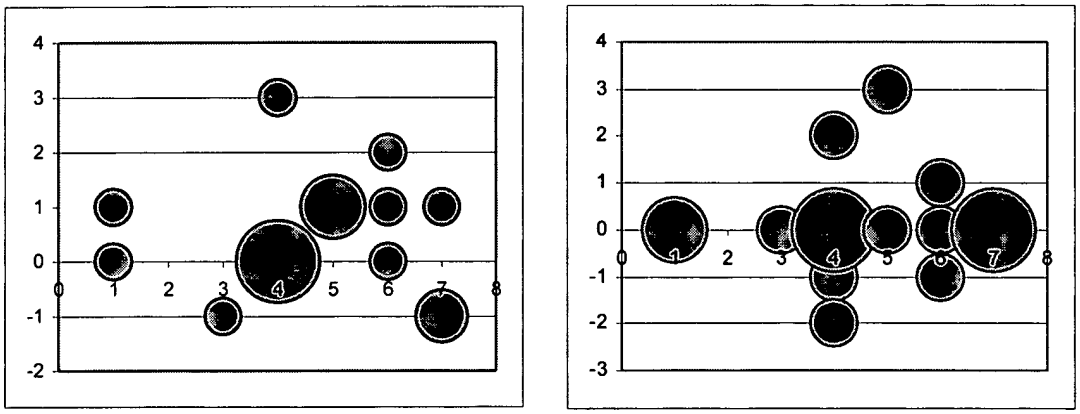


Figure 6. Rating differences for "Main three Bulgarian players injured after Bulgaria-Spain football match" (left) and "Earthquake hits Bulgaria" (right) after seeing the "England football team has to play Bulgaria in the next round" news item (y-axis), plotted against the rating of the subject for the latter (x-axis). Size of the bubbles indicates number of subjects.

6 Conclusions

Group modeling is an interesting research area with a wide possibility of applications, both in interactive television and beyond. In this paper, we have defined the problems associated with adaptation to groups, described our initial research in this area, discovered some answers and many more questions that need answering.

6.1 Conclusions from the study

The main results from this study are:

- People use some of the choice strategies described in Section 2, such as the Average Strategy (a.k.a. Additive Utilitarian), the Average Without Misery Strategy and the Least Misery Strategy, and care about fairness and avoiding individual misery. (Experiment 1)
- People use normalization: their satisfaction does not only depend on the selected items, but also on the not selected ones. (Experiment 2)
- People deduct misery: their satisfaction is negatively affected by disagreeable experiences, more than because of losing out on possible pleasure. (Experiment 2)
- People use the ratings in a non-linear way: i.e. the difference in ratings between say 9 and 10 is regarded as larger than that between 7 and 8. (Experiment 2)
- The "Normalized Quadratic Addition, Pleasure minus Misery" satisfaction functions produced reasonable, though not completely correct predictions. (Experiment 2)
- The sequences produced by five choice strategies (Borda Count, Multiplicative Utilitarian, Average without Misery, Most pleasure, and Additive Utilitarian) gave, in our example, on avarage satisfaction to all individuals in the group. (Experiment 2)
- Multiplicative Utilitarian seems the best strategies as it's sequence produced satisfaction for all individuals in the group according to all subjects. (Experiment 2)
- People's opinion about items can change dramatically as a result of watching another item. Hence, ratings need to be recalculated after showing each item, and a new Group list needs to be determined before selecting the next item. (Experiment 3)
- People's opinion about items can change as a result of the mood induced by watching an item. Watching a very sad item can decrease the ratings for other items. Contrary to expectation, it does not seem to decrease the ratings of conflicting mood items more than those of similar mood. (Experiment 3)
- People's opinion about items can change as a result of their topical relatedness to a shown item. There is an interaction with Satisfaction: if the person is interested in the shown item, than the ratings of topically related items are more likely to increase. (Experiment 3)

6.2 Limitations of the study

Indirectness of the experiments

As discussed in Sections 3 and 4, we have deliberately chosen to make the experiments *indirect*. In Experiment 1, rather than having an actual group sit down to decide what to watch, subjects were asked what they *thought* people should watch. In Experiment 2, rather than having an actual group sit down and *measure* how satisfied each individual would be with a certain sequence, subjects were asked how satisfied they *thought* all members of the group would be. In Experiment 3, real news headings were used for items, rather than the abstract items used in the earlier experiments. But again, we did not really show the items to the subjects, but asked them how much they wanted to see them and how they *expected* viewing them would make them feel. We explained the reasons for this indirect approach in Sections 3 and 4, and they mainly had to do with controlling the experiment. However, as always, the more an experiment is controlled, the less it resembles the real world.

Subjects used in the experiments

The sets of subjects were quite homogeneous, particularly the level of education: either having or studying for a degree, mostly in computing. Subjects were also from a relatively narrow age range (though not as narrow as the word "student" suggests, as we have a large proportion of mature students), and the majority of subjects in Experiments 1 and 3 were male. This raises some doubts about the generalisability of the results, as the demographic of a television audience is a lot more heterogeneous. However, as the indirectness of our experiments did require a certain level of education, it would have been impossible to use a cross section of the population. This would also have required a rather large group of subjects. Nevertheless, the generalisability of the results remains to be proven.

Example used in the experiments

In both Experiments1 and 2, we have used the example of a group of three people, with particular ratings for these three people. It still needs to be proven that our result about the suitability of the strategies is generalisable to larger groups, and different rating distributions.

Assumptions made

As discussed in Section 2, we have made a number of assumptions. In a sense, all of them are limitations of this study. The most important limitation seems our assumption that ratings are accurate: recommender systems need to be able to deal with uncertainty. This might mean that rather than having an accurate rating for an individual for an item, we might have a probability distribution that indicates the likelihood of certain ratings for that item. Or it might mean that we have an estimated rating with an indication of how certain the system is about its estimation. Taking uncertainty into account would have made our experiments far more complicated. We had, therefore, decided to separate concerns, and start with the assumption that ratings were accurate. We believe that most results –in the sense of what is important to people, like avoiding misery- would still hold when dealing with uncertainty, but that an additional set of rules would apply in that case.

6.3 Areas for further work

Our research has only just started, and raises many questions that warrant further research. For example:

- The Multiplicative Utilitarian strategy seems a good strategy to use, but more experiments are needed to confirm this. These experiments would need to deal with the limitations mentioned above.
- One way to reduce the effort involved in empirical evaluations would be to have a good Satisfaction Function to predict experimental results. The "Normalized Quadratic Addition, Pleasure minus Misery" satisfaction function is a promising start, but needs further improvement to become more accurate.
- Finding a highly accurate Satisfaction Function would also allow us to mathematically determine the optimal strategy.
- The ordering of the sequence requires more investigation. This is not only a group adaption issue, but applies also when dealing with only one viewer. We need to determine what exactly the effect of mood is, how to correctly predict the size of the effect of topical relatedness on ratings, and how to deal with the importance dimension.
- Invisible members can be added to a group (to represent teachers, or parents) to ensure that a viewer's (student or child) overall viewing experience is more appropriate. It should be investigated how this can be done and can be made both acceptable and beneficial for the viewer. Similarly, television critics could be added as members of a group. Their ratings would accurately reflect their opinions.
- An individual's satisfaction might be influenced by adequate user interface design. For instance, when showing an item, it could be indicated to the viewers what the next item(s) will be (for instance, using a subtitle). This tells viewers who do not like the current item that the next one will be to their taste. This might avoid dissatisfaction, boredom, and walking away from the television.

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Appendix A

Scenario 1

John, Mary, and Adam are going to watch video clips together. We know how interested they are in the topics of the clips. Each clip is rated from 1 - really hate this topic - to 10 - really like this topic.

Clip	John	Adam	Mary
A	10	1	10
B	4	9	5
C	3	8	2
D	6	9	7
E	10	7	9
F	9	9	8
G	6	6	5
H	8	9	6
I	10	3	7
J	8	8	6

1. They only have time to watch one clip. Which clip should they watch? Why?
2. They only have time to watch two clips. Which clips should they watch? Why?
3. They only have time to watch three clips. Which clips should they watch? Why?
4. They only have time to watch four clips. Which clips should they watch? Why?
5. They only have time to watch five clips. Which clips should they watch? Why?
6. They only have time to watch six clips. Which clips should they watch? Why?
7. They only have time to watch seven clips. Which clips should they watch? Why?

Scenario 2

John (29), Mary (32), and their grandfather Adam (81) are going to watch video clips together. We know how interested they are in the topics of the clips. Each clip is rated from 1 - really hate this topic - to 10 - really like this topic.

Clip	John	Adam	Mary
A	10	1	10
B	4	9	5
C	3	8	2
D	6	9	7
E	10	7	9
F	9	9	8
G	6	6	5
H	8	9	6
I	10	3	7
J	8	8	6

1. They only have time to watch one clip. Which clip should they watch? Why?
2. They only have time to watch two clips. Which clips should they watch? Why?
3. They only have time to watch three clips. Which clips should they watch? Why?
4. They only have time to watch four clips. Which clips should they watch? Why?
5. They only have time to watch five clips. Which clips should they watch? Why?
6. They only have time to watch six clips. Which clips should they watch? Why?
7. They only have time to watch seven clips. Which clips should they watch? Why?

Appendix B

Age: Gender: M / F

You and two friends (Friend1 and Friend2) are going to watch video clips together. The Television knows how interested you are in the topics of the clips. Each clip is rated from 1 -really hate this topic- to 10 - really like this topic.

Clip	You	Friend1	Friend2
A	10	1	10
B	4	9	5
C	3	8	2
D	6	9	7
E	10	7	9
F	9	9	8
G	6	6	5
H	8	9	6
I	10	3	7
J	8	8	6

It decides to show you the following sequence of clips: E A F I D

	Very dissatisfied			Neutral			Very satisfied
How satisfied would you be?	1	2	3	4	5	6	7
Why?							
How satisfied do you believe Friend1 would be?	1	2	3	4	5	6	7
Why?							
How satisfied do you believe Friend2 would be?	1	2	3	4	5	6	7
Why?							

Appendix C

Age: Gender: M / F

You are going to watch the evening news. A number of things have happened today, and the news programme has to make a selection about what to show you. Decide for the following new items how *interested* you would be to see them, and how you think they would make you *feel*. Each news item is described by its headline, more detail would be given in the news. Assume all news items to be true.

"[Insert name of your favorite sport's club] wins important game"

	Really Hate to			Neutral			Really Want to
How much would you want to watch this news item?	1	2	3	4	5	6	7
	Very Sad			Neutral			Very Happy
How might you expect this news item to make you *feel*?	1	2	3	4	5	6	7

"Fleet of limos for Jennifer Lopez 100-metre trip"

	Really Hate to			Neutral			Really Want to
How much would you want to watch this news item?	1	2	3	4	5	6	7
	Very Sad			Neutral			Very Happy
How might you expect this news item to make you *feel*?	1	2	3	4	5	6	7

"Heart disease could be halved"

	Really Hate to			Neutral			Really Want to
How much would you want to watch this news item?	1	2	3	4	5	6	7
	Very Sad			Neutral			Very Happy
How might you expect this news item to make you *feel*?	1	2	3	4	5	6	7

"Is there room for God in Europe?"

	Really Hate to			Neutral			Really Want to
How much would you want to watch this news item?	1	2	3	4	5	6	7
	Very Sad			Neutral			Very Happy
How might you expect this news item to make you *feel*?	1	2	3	4	5	6	7

"Earthquake hits Bulgaria"

	Really Hate to			Neutral			Really Want to
How much would you want to watch this news item?	1	2	3	4	5	6	7
	Very Sad			Neutral			Very Happy
How might you expect this news item to make you *feel*?	1	2	3	4	5	6	7

"UK fire fighter strike continues"

	Really Hate to			Neutral			Really Want to
How much would you want to watch this news item?	1	2	3	4	5	6	7
	Very Sad			Neutral			Very Happy
How might you expect this news item to make you *feel*?	1	2	3	4	5	6	7

"Main three Bulgarian players injured after Bulgaria-Spain football match"

	Really Hate to			Neutral			Really Want to
How much would you want to watch this news item?	1	2	3	4	5	6	7
	Very Sad			Neutral			Very Happy
How might you expect this news item to make you *feel*?	1	2	3	4	5	6	7

The first item on the news is **"Brighton University Watts Building on Fire: hundreds feared dead"**

	Really Hate to			Neutral			Really Want to
How much would you want to watch this news item?	1	2	3	4	5	6	7
	Very Sad			Neutral			Very Happy
How might you expect this news item to make you *feel*?	1	2	3	4	5	6	7

Given that you have just seen this item, how much would you now want to watch these items?

	Really Hate to			Neutral			Really Want to
"[Insert name of your favorite sport's club] wins important game"	1	2	3	4	5	6	7
"Fleet of limos for Jennifer Lopez 100-metre trip"	1	2	3	4	5	6	7
"Heart disease could be halved"	1	2	3	4	5	6	7
"Is there room for God in Europe?"	1	2	3	4	5	6	7
"Earthquake hits Bulgaria"	1	2	3	4	5	6	7
"UK fire fighter strike continues"	1	2	3	4	5	6	7
"Main three Bulgarian players injured after Bulgaria-Spain football match"	1	2	3	4	5	6	7

Has watching the "Brighton University Watts Building on Fire: hundreds feared dead" news item changed your opinion? How and why?

Condition B: Same as condition A, only now,
"Brighton University Watts Building on Fire: hundreds feared dead" is replaced by
"England football team has to play Bulgaria in the next round".